

NOTES ON
SOME AFRICAN CERATOPOGONINAE—
SPECIES OF THE GENUS *FORCIPOMYIA*

BY

A. INGRAM

AND

J. W. S. MACFIE

(Received for publication 13 October, 1924)

TABLE OF CONTENTS

	PAGE
INTRODUCTION	533
GENUS <i>Forcipomyia</i>	536
KEY TO THE AFRICAN SPECIES OF THE GENUS <i>Forcipomyia</i>	541
<i>Forcipomyia castanea</i> (Walk.)	546
" <i>biannulata</i> sp.n.	557
" <i>auripes</i> sp.n.	560
" <i>squamipennis</i> sp.n.	562
" <i>lepidota</i> sp.n.	566
" <i>venusta</i> sp.n.	569
" <i>pamptokila</i> sp.n.	570
" <i>nigrotibialis</i> sp.n.	571
" <i>inornatipennis</i> (Aust.)	572
" <i>birsuta</i> sp.n.	577
" <i>tigripes</i> sp.n.	580
" <i>aethiopiae</i> sp.n.	582
" <i>ingrami</i> Cart.	584
" <i>exigua</i> sp.n.	587
" <i>asbantii</i> sp.n.	589
" <i>melanbroa</i> sp.n.	591
" <i>nigeriensis</i> sp.n.	592

The collections of Ceratopogonine midges made by us at Accra, mostly between the years 1919 and 1922, contained very numerous specimens of *Forcipomyia*; indeed, certain species of this genus (e.g., *F. castanea*, *F. ingrami*, and a species allied to *F. chrysolopha*) were amongst the most abundant in the laboratory where the majority of our specimens were obtained. The task of examining so large a number of specimens has been no light one and for unavoidable reasons has only been completed recently, the results being embodied in the following paper. In addition to our Accra collections we have had at our disposal a small number of specimens from other places in the Gold Coast and from Nigeria, and we have been

privileged, thanks to the kindness of Dr. G. A. K. Marshall, to examine a small collection of *Forcipomyia* belonging to the Imperial Bureau of Entomology. This collection, which is largely composed of specimens taken by ourselves before we began our investigation, contains specimens from various parts of East and West Africa, and although not including any species not previously identified in our own collections, extends in several cases the range of distribution.

The large number of specimens at our disposal has enabled us to study in a few species the important question of the range of variation, with results which are interesting although rather disconcerting. We have found, for example, that such a character as the presence of bands on the legs is liable to great variation, and that colour markings are sometimes quite unreliable as specific characters. In a long series of specimens of *F. ingrami* we have found the general colouring to vary from very dark brown to quite a pale, yellowish-brown; in *F. castanea* the characteristic sepia-brown band on the hind femora may vary considerably in size and depth of colour, may be reduced to a mere spot, or may be entirely absent; and in *F. inornatipennis* the legs may be uniformly coloured, or may show dark bands on the hind femora only, on the hind femora and tibiae, or on both middle and hind legs. On the other hand, identical colour markings may be no sure indication of specific identity, for from a long series of specimens somewhat resembling *F. chrysolopha*, we have separated males of three species with quite dissimilar genitalia which we are unable to distinguish by any other characters. Such observations inevitably shake confidence in specific differentiations based mainly or entirely on colour markings, and make it difficult or impossible to estimate the value of descriptions, written perhaps many years ago, at a time when morphological characters, especially those of the genitalia, were either ignored or referred to but briefly. In the present state of knowledge it appears impossible to tell whether certain species of *Forcipomyia* are really different or differ only in description, and no decision can be reached without a re-examination of the type specimens.

In the descriptions of species which follow, we have given a somewhat detailed account of *F. castanea*, because we have in our possession abundant adult specimens of this species, both males and

females, and also pupae, larvae, and eggs, and have curtailed so far as possible the descriptions of the other species. The unit frequently referred to in the text is 3.7μ . All measurements were made from specimens immersed in pure carbolic acid, and thus restored to their natural size and not shrunken as they tend to be when dry. The midges vary considerably in size, the ratios of the measurements are therefore probably of greater value than the actual measurements themselves.

The types and co-types of the new species described have been deposited in the collection of the Liverpool School of Tropical Medicine.

In some of our previous papers we have given keys for the identification of the Gold Coast species of certain genera of Ceratopogoninae. In this paper we venture to go a step further and have attempted a key for the identification of the African species of the genus *Forcipomyia*. We have done this, because it is now known that many Ceratopogonine midges are widely distributed in Africa (*e.g.* *Culicoides schultzei* in East, South, and West Africa, and in Egypt) and it is probable that, as time goes on, many more will be found to extend over a large part of the Continent, including regions with dissimilar climates. Some species, indeed, appear to have an even more extensive range of distribution, and although it is certainly artificial to make a limit of the shores of the Mediterranean, the Suez Canal, and the Red Sea, it appears to us that no grouping would be entirely satisfactory which did not include all known species (a project at present impracticable), but that in the meantime a key to the African species would be useful.

In drawing up our key we have used primarily the following characters in order:—the presence or absence of scales, the relative lengths of the first and second tarsal segments of the hind legs, the presence or absence of pale coloured spots on the wings, the adornment of the legs, and the form of the antenna of the females. They are all characters readily seen with a hand-lens or low-power microscopic objective, excepting the first, which we felt compelled to use as it has been made a generic character by Kieffer and certainly appears to separate off a somewhat compact group of species, which we regret is not always easy to make out in dry specimens. We have encountered great difficulties, to some of which we have already

referred. Unfortunately, also, only one sex is known of many species; the genitalia of males (which furnish most valuable differential characters) are often described imperfectly, as seen with a hand lens; there is often doubt as to whether descriptions are adequate in the case of important characters (such as the presence of scales) not easily determined at low magnifications; and with the exception of the species described below and two others from Egypt previously described by one of us, we have had no opportunity of augmenting the published descriptions by reference to the insects themselves. Our key, therefore, can only be regarded as tentative. It almost certainly includes as different species several which are actually identical.

GENUS FORCIPOMYIA (Megerlé, 1818) Kieffer, 1901

EXTERNAL MORPHOLOGY.

ADULTS. Cuticle all over the body covered by minute upright microtrichia. *Head.* Eyes usually bare; but the cuticle between the eyes and the bases of the antennae is covered by minute hairs, and a very few similar hairs may be found occasionally between the facets at the margin of the eyes; no account is taken, however, of such hairs in the descriptions of species which follow. Eyes usually broadly contiguous above in both sexes, the facets separated by a narrow line. Vertex and occiput, in both sexes, bearing numerous, stout, forwardly-projecting hairs, and sometimes scales also. Immediately in front of the anterior border of the eyes is a conical thickening of the cuticle or callosity which is sometimes prominent. Clypeus pronounced, especially in females, hairy.

Mouth-parts. Proboscis rather longer than the head in females, shorter in males. The component organs generally similar to those of *Culicoides* (see *F. castanea*), mandibles armed with numerous small teeth, maxillae with fewer, delicate, widely-spaced teeth. Palpi in both sexes composed of five segments, bearing moderately long and short hairs. Second, fourth, and fifth segments usually about sub-equal, about twice as long as broad. The third segment the largest, usually as long as the fourth and fifth together, inflated about the middle or basally, in some species very greatly, and containing a sub-spherical or oval sensory pit opening on the inner

aspect, in which are a number of minute, modified, drumstick-like, sensory hairs. In some species modified sensory hairs are present also on the surface of the third segment on its inner aspect. The fifth segment only slightly if at all expanded at its end. In the males the palpi are usually more slender than in the females, and the third segment inflated to a lesser degree and furnished with a smaller sensory pit.

Antennae. Composed of fifteen segments, not sculptured ; pilose in the female, plumose in the male. In the female the first segment small, bearing stout hairs which are directed anteriorly and are sometimes pubescent. Torus sub-spherical, bearing a few small hairs. Third segment sub-spherical or oval, larger than the fourth, with a posterior stalk of variable length. Segments four to ten usually sub-spherical to oval, sometimes flask-shaped, becoming progressively longer and narrower towards the tenth ; segments eleven to fifteen sometimes forming an almost continuous series with the basal segments, sometimes elongated, sub-cylindrical, an abrupt change of shape taking place between the tenth and eleventh segments. The combined length of segments 3 to 10 usually greater than that of segments 11 to 15. The last segment is the longest and ends in a blunt, often club-shaped, stylet. Hairs on the basal segments short, about twice the length of the segments or less, arranged in whorls of frequently about a dozen or more hairs. Hairs on the five distal segments usually rather shorter, those arising posteriorly the longest, forming a whorl, the rest scattered. All the flagellum segments bear small, colourless spines ; the basal segments bear also longer spines which are usually curved or geniculate, and may be very stout and either pointed or blunt. In the male the first segment devoid of hairs. Torus very large, shaped like a Dutch cheese hollowed out in the middle anteriorly, without hairs. Third segment sub-spherical, smaller than the fourth, from which it is separated by a wide membranous interspace, with a rather long stalk. Segments four to eleven from sub-spherical to irregularly ovate, broadly united, gradually becoming narrower and more drawn out anteriorly towards the eleventh ; segments twelve to fifteen elongated, sub-cylindrical, sharply separated from one another, the twelfth usually much the longest and shaped like the eleventh, but with the distal end greatly extended, the relative lengths of the other three varying

in different species. The last segment is broader than the others and ends in a blunt, often club-shaped stylet. Large spines are present on the basal, and smaller spines on all the segments of the flagellum; and on segments four to twelve are large whorls of hairs, transverse on the basal segments but oblique on the more distal ones, forming a plume which reaches nearly to the level of the end of the antenna. The whorl on segment three is reduced; on segments thirteen to fifteen are numerous shorter hairs, those at the bases of segments thirteen and fourteen arranged as small whorls.

Thorax strongly arched, but not projecting anteriorly over the head. Thoracic pits absent. Dorsum clothed with short hairs and sometimes scales, and bearing laterally and posteriorly a few longer, stouter hairs, some of which in some species form a curved row on each side a little anterior to the scutellum. Dorsum often adorned with three broad longitudinal stripes separated by narrow, paler-coloured lines, the middle stripe deficient posteriorly, and the lateral ones deficient anteriorly; more laterally there is often an additional, small, narrow, longitudinal stripe on each side. Scutellum a transverse strip of chitin with a concave anterior and convex posterior border; bearing numerous bristles and hairs and sometimes scales. Post-scutellum devoid of hairs.

Wings usually unadorned, but sometimes with one or more pale spots. Surface of the wings entirely covered with minute microtrichia which vary in size in different species to some extent, but are smaller than those of *Atrichopogon*; and more or less densely clothed with larger, decumbent hairs or scales. The decumbent hairs are more or less lanceolate and curved, less straight and rigid-looking than in *Atrichopogon* and not tapering so regularly to sharp points; they are sometimes sub-plumose. The hairs are usually denser and darker on the anterior part of the wing, but there is a small area in this region, immediately distal to the end of the costa, which is bare. There are no bare areas along the veins as in *Atrichopogon*. The fringe on the posterior border of the wing is long, composed of one or two rows of long hairs between two rows of shorter, oblique hairs—the hairs lanceolate, angled or curved, and sometimes pubescent or even sub-plumose. The wing of the female is broad, in most species broadest near the base, with a rounded tip and a well-formed anal

angle; that of the male is longer and narrower, and usually much paler in colour. The costa reaches to about the middle of the wing. The first and third veins are more or less fused basally, the first radial cell being completely absent or reduced to a mere slit, visible only with the aid of staining reagents. Distal radial cell well-formed, generally triangular, but varying in size and shape in different species. Radio-medial cross-vein oblique. The distance from the cross-vein to the base of the fifth vein greater than the distance from the cross-vein to the end of the costa. Fourth vein with a short petiole, about the same length as the cross-vein; rami long, more or less obsolete proximally. Fifth vein forking near the level of the end of the costa, either a little distal to it or a little proximal to it; anterior ramus continuing the line of the stem; in most species both rami reaching the margin of the wing at a level distal to that of the end of the costa. Intercalary veins well-developed; that between the end of the costa and the tip of the wing Y-shaped.

Legs often adorned with darker bands or spots on the femora and tibiae, and tarsal segments frequently infuscated; somewhat densely clothed with hairs which are sometimes very long, and in certain species bearing also scales. Femora not greatly swollen, unarmed, but occasionally bearing hastate spines. Tibiae not greatly swollen; occasionally bearing hastate spines. Fore tibiae armed at the distal extremity with a stout spur, a patch of strong, spine-like hairs, and an oblique transverse row of short, fine bristles; middle tibiae usually unarmed, but a few bristles in a transverse row near the apex are highly developed and may be of great length; hind tibiae with a stout spur and two transverse rows of graded bristles apically which are similar to those of *Culicoides*, but composed of more numerous elements. Tarsal segments with apical bristles on the first four segments differentiated, spine-like; and a more or less complete longitudinal row, or rows, of similar differentiated bristles on the three first segments. Fifth tarsal segment unarmed. All the tarsal segments cylindrical; the first may be longer or shorter than the second or of equal length, the third, fourth, and fifth progressively diminishing in length. Claws equal, about half the length of the last tarsal segment, sharply curved; in the female simple, in the male usually with bifid ends, and more delicate and more sharply curved than in the female.

Empodium about as long as the claws, with long hairs on both lateral margins.

Abdomen short and broad in the female, longer and more slender in the male; not petiolate. Hypopygium of the male large and conspicuous. Lamellae of the female small and rounded. Well-clothed with hairs and sometimes scales. Spermathecae usually two in number, highly chitinised, oval or pyriform in most species; the commencement of the duct often chitinised for a short distance.

External genitalia of the male. The hypopygium is relatively large and complex, and presents morphological characters which are of value in distinguishing closely-allied species, and in some cases indeed have been the only structures in which we have been able to detect specific differences. In describing the various structures composing the hypopygium we have adhered to the nomenclature used in our previous papers.

The *ninth segment* is well-chitinised, often somewhat narrowed anteriorly, so that the tergite which is narrowed posteriorly also, has a shape suggestive of the 'lozenge'; both tergite and sternite usually well-clothed with moderately long hairs. Sternite usually not notched in the middle line posteriorly. Tergite relatively short, prolonged posteriorly as a membranous extension bearing dorsally a pair of long, stout hairs, and terminating laterally in small, irregularly-shaped processes which are often slightly chitinised and bear usually two long and two short hairs. *Forceps* well-developed, highly chitinised. Side-pieces large, oval, densely clothed with hairs, some of which are often of great length. Dorsal root-like process long and slender, highly chitinised, often appearing to be jointed at its base. Claspers about as long as the side-pieces, usually less highly chitinised, broad at the base and narrowing rapidly towards the apex; clothed at the base at least with minute hairs intermixed with which are a few larger hairs, and bearing at the apex a few minute hairs. *Harpes* usually in the form of two chitinised admedian plates or rods which project posteriorly and slightly ventrally, may or may not be joined anteriorly across the middle line by a strip of chitin, and articulate by their proximal ends with the distal ends of the dorsal root-like processes at the bases of the side-pieces. In some species, however, no such posteriorly projecting structures are present, and the dorsal root-like

processes at the bases of the side-pieces join across the middle line anteriorly. The harpes vary in shape and size in different species, and are of great systematic value. *Aedoeagus* a complicated structure, more or less conical, triangular, shield-shaped, or stirrup-shaped in ventral-view, and largely membranous or but feebly chitinised. The aedoeagus varies greatly in shape in different species and is of value in distinguishing them.

PUPA AND LARVA. A detailed morphological study of the pupa and larva of *Forcipomyia* has recently been published by Saunders. As we succeeded in obtaining materials illustrating the early stages of only two species, and as Saunders states that he expects shortly to publish descriptions of the early stages of further, exotic species, it is only necessary for us to refer here to his work.

KEY TO THE AFRICAN SPECIES OF THE GENUS
FORCIPOMYIA

1. With scales (*Lepidobelea*) 2
Without scales 15
2. First tarsal segment of hind legs longer than second* 3
First tarsal segment of hind legs shorter than second or of about equal length 4
3. Legs entirely brown ; first tarsal segment of hind legs only slightly longer than second *F. armaticrus*, K.†
Femora and tibiae dark brown, tarsi yellowish ; first tarsal segment of hind legs decidedly longer than second *F. auripes*, sp.n.
4. Wings adorned‡ 5
Wings unadorned 9
5. Wings with a single pale spot, situated about the middle of the anterior border, in the region of the end of the costa 6
Wings with several pale spots 7

* In all the species examined by us [excepting *F. ingrani*] the ratio of the length of the first tarsal segment of the hind legs to the second, although varying somewhat, is similar in the two sexes, and in this key where only one sex is known we have assumed that the ratio is approximately the same in both sexes.

† It is difficult to place this species in the key correctly, because part of the description appears to have been dropped out by the printer ; we have, therefore, inserted it twice.

‡ By adornment we mean with pale spots. No account is taken, however, of the usual small bare area just beyond the end of the costa which may simulate a spot, nor of appearances due to the darkening of the anterior part of the wing produced by greater density of hairs and scales in this region, nor of the pallor sometimes visible at the extreme base of the wing.

6. Hind femora with a dark brown apical band, and hind tibiae with a dark brown basal band *F. biannulata*, sp.n.
 Hind femora with a narrow sepia-brown band or spot a little distal to the middle *F. castanea*, (Walk.)
 Hind femora without bands or spots..... *F. castanea* (Walk.) var. *incomptifeminibus* (Aust.)
7. Antenna of female with last segment twice as long as broad; that of the male with 13th and 14th segments sub-equal, about half the length of the 12th..... *F. chrysolopha* (K.)
 Antenna of female with last segment about three or four times as long as broad; that of the male with 13th segment longer than the 14th and more than half the length of the 12th 8
8. Harpes of male large, hook-like; antenna of female with segments 4 to 10 flask-shaped, about two to two-and-a-half times as long as broad, bearing long, slender, pointed spines *F. squamipennis*, sp.n.
 Harpes of male long, stout, with rather blunt ends; antenna of female with segments 4 to 10 less than twice as long as broad, bearing very stout, blunt spines *F. lepidota*, sp.n.
 Harpes of male long, with filiform ends; antenna of female as in *F. lepidota* *F. venusta*, sp.n.
 Harpes of male long, with ends a little expanded like a duck's head; female unknown..... *F. pampoikila*, sp.n.
9. Hind femora with dark bands or other markings 10
 Hind femora without dark bands or other markings 13
10. Hind tibiae almost entirely dark brown, only the extreme apex being slightly tawny *F. nigrotibialis*, sp.n.
 Hind tibiae with at most a single dark brown band... *F. inornatipennis* (Aust.)
 var. *ornaticrus*, var.n.
 Hind tibiae with two dark brown bands 11
11. Bands on the hind tibiae at the extremities, with a clear ring between them *F. nilotica* (K.)
 Distal dark band on the hind tibiae not reaching the extremity of the segment 12
12. Darkish brown; very hairy; antenna of male with the combined length of segments 3 to 11 almost equal to that of segments 12 to 15, segment 12 three-and-a-half times as long as segment 11 ... *F. hirsuta*, sp.n.
 Yellow or whitish; antenna of male with combined length of segments 3 to 11 as long as that of segments 12 to 15, segment 12 two-and-a-half times as long as segment 11..... *F. ornatipes* (K.)
 Light brown; antenna of male with combined length of segments 3 to 11 greater than that of 12 to 15, segment 12 only twice the length of segment 11..... *F. tigripes*, sp.n.

13. First tarsal segment of hind legs slightly longer than second..... *F. armaticrus*, K.
 First tarsal segment of hind legs clearly shorter than second, one-half to two-thirds the length 14
14. Legs yellowish; terminal segments (11 to 15) of antenna of female over four times as long as broad; spermathecae oval, 80-130 μ by 60-80 μ , practically no part of the duct chitinised *F. inornatipennis* (Aust.)
 Legs brown; terminal segments of antenna of female about three times as long as broad; spermathecae smaller, subspherical, diameter about 40 μ , the commencement of the duct chitinised for a short distance, about 7 μ *F. nilotheres*, M.
15. First tarsal segment of hind legs longer than the second.....16
 First tarsal segment of hind legs shorter than the second, or of about equal length.....30
16. Wings adorned17
 Wings unadorned18
17. Wings with two pale, yellowish, elongated spots on the anterior border, one covering the distal end of the third vein, and one between the anterior border of the wing and the fork of the intercalary vein; first and third veins forming a small distal cell *F. tangae*, K.
 Wings with grey markings and two dark spots on the anterior border; first and third veins completely fused *F. puncticollis* (Becker)
18. Eyes hairy *F. aethiopiae*, sp.n.
 Eyes bare.....19
19. Antenna of female with the last five segments elongated, an abrupt change of shape between the tenth and eleventh segments20
 Antenna of female with flagellum segments forming an almost continuous series, no abrupt change of shape between the tenth and eleventh segments25
20. First tarsal segment of hind legs only slightly longer than the second, less than twice as long.....21
 First tarsal segment of hind legs twice the length of the second or longer.....23
21. First and third veins of the wing joined for their whole length *F. aplanota* (K.)
 First and third veins forming a distinct distal cell 22
22. Reddish, with pale yellow legs (*i.e.*, as in *F. aplanota*); first and third veins of wing fused in proximal half; scutellum brown (*i.e.*, as in *F. aplanota* female) *F. seychelleana* (K.)
 As *F. seychelleana* but thorax orange-red and abdomen very dark brown..... *F. seychelleana* var. *fulvithorax* (K.)

- Reddish, with pale yellow legs; first and third veins of the wings fused in proximal two-thirds; scutellum yellow in female, dark brown in male... *F. rufescens* (K.)
- Usually dark brown, but sometimes paler brown, with yellowish-brown legs; first and third veins of wing in female with proximal halves contiguous, but actually forming a very narrow proximal cell difficult to distinguish; scutellum brown in both sexes *F. ingrami*, ♀, Carter *
- Yellowish-white or reddish, with yellow legs; first and third veins of wing confluent in their proximal halves; scutellum (female) brown or dark brown *F. kribiensis* (K.)
23. Terminal segments of antenna of female three to four times as long as broad; very dark brown species with yellowish legs; bifurcation of the fifth vein of wing proximal to the end of the costa..... *F. mabensis* (K.)
- Terminal segments of antenna of female twice as long as broad24
24. Very dark brown, legs brownish *F. falcinella* (K.)
Yellow, legs whitish *F. sulfurea*, K.
25. First tarsal segment of hind legs about one-and-a-half times as long as the second26
First tarsal segment of hind legs over twice the length of the second28
26. Dorsum of thorax with three broad, brown, longitudinal stripes *F. abyssiniae* (K.)
Dorsum of thorax uniformly coloured27
27. First and third veins of the wing united *F. tavetae*, K.
First and third veins of the wing forming a distal cell *F. egypti*, M.
28. Dorsum of thorax with three broad, darkish brown, longitudinal stripes *F. exigua*, sp.n.
Dorsum of thorax uniformly coloured29
29. Antenna of female with combined length of segments 3 to 10 one-quarter longer than that of segments 11 to 15; whorls of 6 or 7 hairs *F. seneveti*, K.
Antenna of female with combined length of segments 3 to 10 equal to that of segments 11 to 15; whorls of 10 to 12 hairs *F. seneveti* var. *biskraensis*, K.
30. Wings adorned31
Wings unadorned36
31. Wings with several pale spots *F. pretoriana* (K.)
Wings with a single pale spot about the middle of the anterior border, in the region of the end of the costa32

* In the male *F. ingrami*, the first tarsal segment of the hind legs is shorter than the second.

32. Legs with darker brown bands or spots33
 Legs without such markings34
33. Hind femora with a narrow sepia-brown band or spot a little distal to the middle, hind tibiae unadorned; harpes of the male with pointed but not filiform ends..... *F. castanea* (Walk.)*
 Hind femora with a dark brown apical band, hind tibiae with a dark brown basal band; harpes of male with filiform ends, but no patch of teeth at the base of the side-pieces..... *F. biannulata*, sp.n.*
 Hind femora with an inconspicuous spot at the distal end, hind tibiae sometimes with a trace of a band a little below the knee; harpes of male with filiform ends, side-pieces with a patch of spines or teeth on the inner basal aspect *F. asbantii*, sp.n.
34. Whitish; combined length of segments 3 to 10 of antenna of female a half greater than that of segments 11 to 15 *F. leucochaeta* (K.)
 Brown or dark brown; combined length of segments 3 to 10 of antenna of female only slightly greater than that of segments 11 to 15...35
35. Last five segments of the antenna of the female elongated, segments 11 to 14 two to three times as long as broad; an abrupt change of shape between segments 10 and 11 *F. castanea* (Walk.) var. *incomptifeminibus* (Aust.)*
 Last five segments of antenna of female not so much elongated, segments 11 to 14 nearly twice as long as broad; change of shape between segments 10 and 11 not abrupt..... *F. striaticornis* (K.)
36. Legs with darker brown bands or spots.....37
 Legs unadorned with darker markings41
37. Hind legs with a dark spot at the distal end of the femora only.....38
 Hind legs with bands on both femora and tibiae.....39
38. Thorax dark brown; terminal segments of the antenna of the female three times as long as broad *F. lasionota* (K.)
 Thorax pale yellow; terminal segments of the antenna of the female only twice as long as broad *F. lasionota* var. *callitborax* (K.)
39. Yellow; thorax with three broad, brown, longitudinal bands on the scutum..... *F. fusciforceps* (K.)
 Mainly dark brown, with yellow legs; thorax without dark longitudinal bands on the scutum40

* *F. castanea*, *F. castanea* var. *incomptifeminibus* and *F. biannulata* are inserted in the key twice as the scales are apt to be overlooked.

40. Hind legs with distal third of femora and proximal third of tibiae brown *F. kilemae*, K.
Hind legs with femora except the base, and tibiae except the extremity, brown *F. sabariensis*, K.
41. Legs dark brown 42
Legs yellowish 43
42. Very dark brown; dorsum of thorax showing indistinctly three broad longitudinal stripes *F. melanchroa*, sp.n.
Dull darkish brown; dorsum of thorax uniformly darkish brown *F. nigriensis*, sp.n.
43. Females known 44
Only males known 45
44. Terminal segments of the antenna of the female elongated, clearly differentiated from the basal segments *F. maura* (K.)
Terminal segments of the antenna of the female not clearly differentiated from the basal segments; no abrupt change of shape between segments 10 and 11 *F. radiifer* (K.)
45. First and third veins of the wing confluent, no cell *F. niligena* (K.)
First and third veins forming a distal radial cell... 46
46. Very dark brown, legs pale yellow; hind tarsi with the first segment less than half the length of the second *F. pylonota* (K.)
Not so dark brown; hind tarsi with the first segment only slightly shorter than the second 47
47. Harpes without rod-like posterior structures *F. ingrani*, ♂, Carter
Harpes with rod-like posterior processes which terminate in sharp points *F. catanei*, K.

FORCIPOMYIA CASTANEA (Walk.)

Length of body* (average), 2 mm.; length of wing, 1·4 mm.; greatest breadth of wing, 0·5 mm. The size is variable, the length of the body of the females measured by us ranging from 1·4 mm. to 2·2 mm. In the male the length of the body is greater than in the female, owing to the size of the hypopygium, and the wings are narrower.

Head dark sepia-brown; occiput bearing numerous, long, dark brown hairs which overhang the eyes. Eyes bare†; broadly

* In all cases this measurement is taken from the anterior margin of the thorax to the tip of the abdomen of specimens mounted in pure carbolic acid.

† The cuticle between the eyes and the bases of the antennae is covered with minute hairs, and a very few similar hairs may be found occasionally between the facets at the extreme inner margins of the eyes. No account is taken of such hairs, however, in the description of this insect, or of the following species.

contiguous above in both sexes, but with the facets separated by a narrow line. Clypeus dark brown; in the female somewhat elongated, bluntly rounded distally, bearing about sixteen dark brown hairs which are mostly grouped along the middle line; in the male shorter, more rounded. Proboscis dark brown, in the female rather longer than the head, in the male shorter. Labium shorter and broader than in *Culicoides*. Stylets well-developed, chitinous. Labrum in the female highly chitinised, with sides parallel to the distal fourth, then gradually tapering to a narrowly rounded apex and bearing a delicate fringe; in the male similar but less highly chitinised and more sharply attenuated distally, with dense hair-like processes over the distal third. Mandibles in the female long, broad, strongly chitinised, blade-like and pointed, with numerous (about twenty-five) closely apposed, blunt teeth extending almost half the length of the inner margin; in the male similarly shaped, well-developed, highly chitinised but not so strongly as in the female, without teeth. Maxillae very similar to those of *Culicoides*, extending forwards rather less than the mandibles, less highly chitinised, more delicate and narrower, the distal fourth with about ten delicate, rather widely spaced teeth; in the male well-developed, thinly chitinised, apex with fairly long and strong hairs. Hypopharynx in the female highly chitinised, similarly shaped to that of *Culicoides*, but distally somewhat narrower, broad at the base, tapering gradually to the distal fourth and then more rapidly to the pointed apex, distal margin smooth; in the male as in the female, dense, sharply pointed. Palpi (fig. 1, A and B) dark brown, bearing rather numerous and long dark brown hairs: first segment small, second, fourth, and fifth small, sub-equal, third large, longer than any two of the other segments together, basal half swollen and furnished with a large, oval sensory pit with a circular orifice. *Antennae* uniformly darkish brown, bearing similarly coloured hairs. In the female segments 3 to 10 bearing long, stout spines which are almost straight, colourless, and about as long as the segments, and whorls of about twelve dark brown hairs which are about twice as long as the segments; segments 11 to 15 bearing numerous smaller spines and small basal whorls of hairs. First segment a ring of dark brown chitin, bearing numerous dark brown hairs. Torus dark brown, sub-spherical, bearing a few dark brown

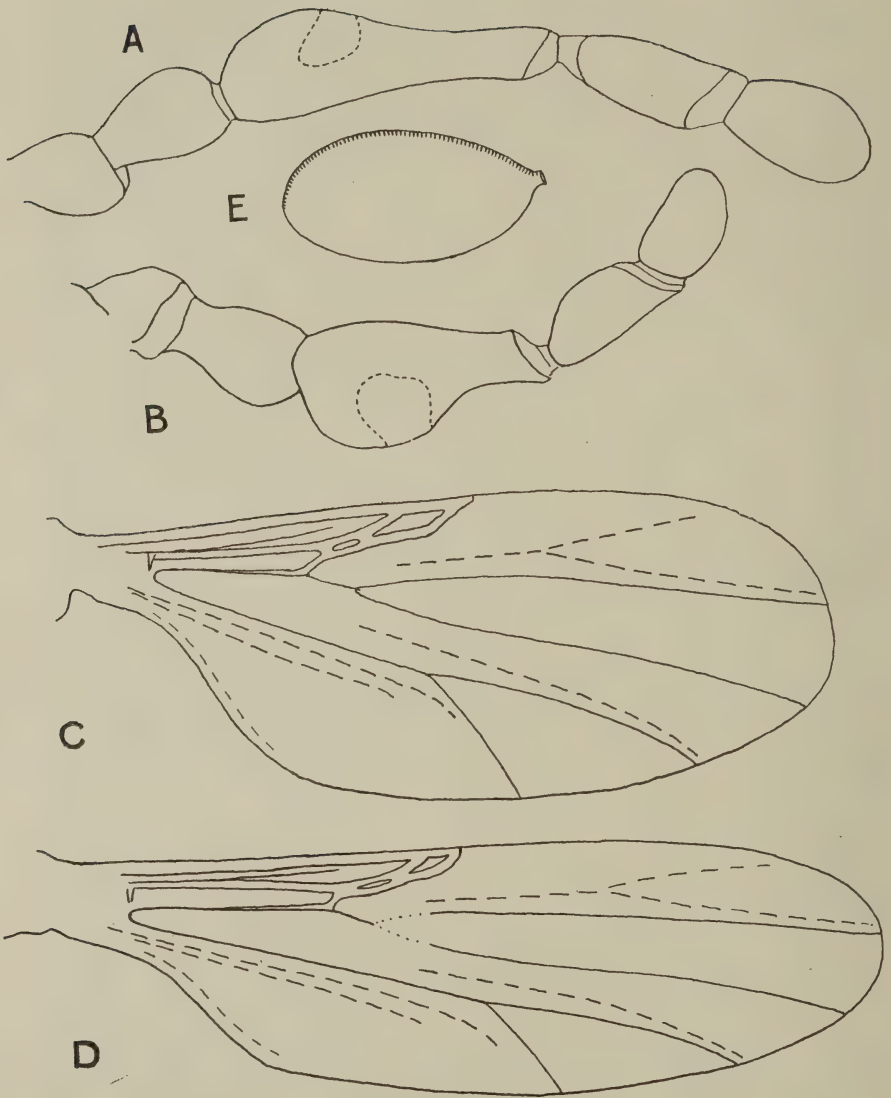


FIG. 1. *Forcipomyia castanea* (Walk.). A—Palp of ♂. B—Palp of ♀. C—Venation of wing, ♀. D—Venation of wing, ♂. E—Spermatheca. C and D $\times c. 80$; others $\times c. 400$.

hairs. Third segment sub-spherical, with a short stalk. Segments 4 to 10 sub-equal, a little longer than broad (11 to 7 units) somewhat flask-shaped. Segments 11 to 15 elongated; 11 to 14 sub-cylindrical, contracted into a neck just before the apex, sub-equal, about two to three times as long as broad; the fifteenth stouter, slightly longer, ending in a blunt, club-shaped stylet. The combined length of segments 11 to 15 about equal to that of segments 3 to 10 and a little greater than that of segments 4 to 10, namely, averaging in three specimens approximately 110, 100, and 90 units respectively. In the male segments 3 to 11 bearing spines, those on the basal segments similar to those of the female, but the others smaller; and large whorls of brown hairs which on the basal segments are almost transverse and situated about the middle of the segments, but become more oblique towards the eleventh segment. The whorls of hairs together form a dense, dark brown plume which reaches nearly to the level of the extremity of the antenna. Torus dark brown, very large, without hairs. Third segment sub-spherical, with a rather long stalk. Segments 4 to 11 sub-spherical to irregularly ovate, becoming narrower and longer towards the eleventh. Segments 12 to 15 elongated, segments 12 to 14 slightly expanded basally and measuring respectively in length and basal breadth about 47 by 8, 28 by 7, and 22 by 5 units; the fifteenth segment broader, about 32 by 8 units, and ending in a club-shaped stylet. The combined length of segments 12 to 15 slightly greater than that of segments 3 to 10, *e.g.* about 130 to 115 units. *Thorax*: dorsum uniformly dark sepia-brown, but sometimes showing traces of the narrow, pale, admedian lines which in other species are distinct and divide the scutum into three broad longitudinal stripes; clothed with short, dark brown hairs, intermixed with which are some paler brown hairs. Pleura pale yellowish-brown or cream-buff coloured, sometimes with a dark brown spot beneath the wings. Scutellum dark sepia-brown, bearing in both sexes very numerous long dark brown setae and hairs. Post-scutellum dark sepia-brown, without a central depression. *Wings* (fig. 1, c and d) entirely covered with minute microtrichia and densely clothed with dark brown hairs which are darker and denser on the anterior margin and at the tip of the wing than on the other parts, and some of which are distinctly scale-like; the extreme base of the wing is pale, buff-coloured, and

there is a small pale, yellow or golden spot about the middle of the anterior border which just covers the junction of the third vein with the costa. Fringe well-developed. In the male the wings are much paler than in the female and the pale spot is indistinct; indeed the area distal to it, which is covered with dark hairs, is often more conspicuous; the wings are also narrower and more translucent. Veins yellowish. Costa reaching to about the middle of the wing. First and third veins forming two cells, the distal one the larger, distinct in both sexes, the proximal one slit-like, barely perceptible in the male. Petiole of the fourth vein longer than the cross-vein. Bifurcation of the fifth vein distal to the bifurcation of the fourth, and in the female at about the level of the end of the costa, but in the male some distance distal to this level. Intercalary veins well-developed, that near the tip of the wing with a long stem. Halteres with creamy-white knobs. *Legs* pale yellowish-brown, clothed with hairs and scales of the same colour which are longer in the male than in the female. Hind femora usually with a narrow sepia-brown band a little distal to the middle; this band varies in size and distinctness to a considerable degree, is sometimes reduced to a mere spot, or may even be entirely absent. *F. incomptifeminibus* (Aust.) must therefore be regarded as only a variety of *F. castanea*. Hind coxae with a dark brown spot on the posterior aspect. Terminal tarsal segments usually slightly infuscated. Femora unarmed. Tibiae with lanceolate scales; fore tibiae with a stout pale yellow apical spur. In both sexes the first tarsal segment slightly shorter than the second on all the legs; the proportions of the hind tarsal segments about 44:67:41:28:24. Claws of all the legs equal, small, rather less than half the length of the fifth tarsal segment, curved but not so much as to form a semicircle, and simple in the female, but in the male longer and more slender, more strongly curved than in the female, and with bifid ends. Empodium nearly as long as the claws, with long hairs on both lateral margins. *Abdomen* in the female short and broad, dorsum dark sepia-brown; sides, venter, and cerci paler, yellowish, rather densely clothed with hairs and a few scales which are mostly dark brown; in the male slender, mainly yellowish, but with sepia-brown bands about the middles of the segments which are very variable, but are usually broader on the last three segments, rather sparsely clothed with hairs,

and with a large sepia-brown hypopygium. Spermathecae (fig. 1, E) two, dark brown, highly chitinised, oval or egg-shaped, length about 90μ , greatest breadth about 50μ ; the duct narrow, chitinised for only a short distance (about 7μ) at its commencement.

HYPOPYGIUM (fig. 2). Ninth segment: tergite short and broad, somewhat 'lozenge' shaped, densely clothed with long hairs, posterior margin rounded, with protruding backwards beyond it, a membranous extension bearing on each side a long hair and a well-developed, slightly chitinised process, furnished with two long and two short hairs; sternite rather broad, not excavated in the middle line posteriorly, covered by long hairs. Forceps: side-pieces large,

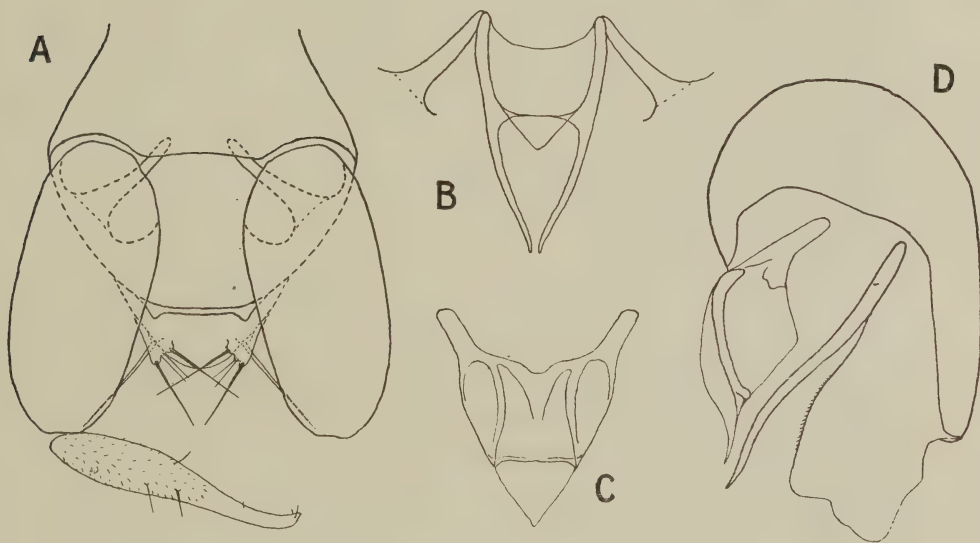


FIG. 2. *Forcipomyia castanea* (Walk.). ♂: Diagrams of hypopygium. A—Ninth segment and forceps, ventral view. B—Harpes, ventral view. C—Aedocagus, ventral view. D—Lateral view to show the relative positions of harpes and aedocagus.

twice as long as broad, straight, densely clothed with hairs some of which are very long, prolonged at its proximal end dorsally as a long rod-like process which articulates with the harpe; claspers similar in form to those of *Culicoides*, about four-fifths the length of the side-pieces, highly chitinised at the distal end, pubescent over the basal half and bearing a few larger hairs. Harpes long, almost straight, rods directed backwards and a little ventrally, moderately well-chitinised, tapering at the apex to sharply pointed tips, their

basal halves united by a thin sheet of chitin which is prolonged posteriorly and medially as a triangular process. Aedoeagus short and very broad, the greater part of it thinly chitinised, terminating posteriorly in a triangular membranous process.

The early stages of *F. castanea* were found by us in 1920 at Accra and Nsawam in rotting fibrous matter at the bases of banana stumps, and were also procured by isolating gravid females taken on the windows of the laboratory in tubes containing rotting vegetable matter. In one such tube in which a single female had been imprisoned on the 15th November, 1920, larvae were first seen on the 23rd (at which time they were already about 2 mm. long), pupae on the 28th, and adults of the new generation on the 30th. From this tube were obtained three adults, fifteen pupae, and thirteen larvae; the original female had therefore laid thirty-one eggs at least. At this time a full description of the larva and pupa was prepared but was not published, and now, as Saunders (1924) has recently given us a most able and detailed study of the anatomy of the early stages of *Forcipomyia* it is possible to curtail it and in some respects modify it.

PUPA (fig. 3, A to E). The duration of the pupal period is about two days. The larvae pupate on the surface of the medium in which they are living, and the pupae are at first a creamy-white colour but rapidly darken. If left undisturbed, the pupae do not change position appreciably before hatching; if immersed in water, however, they move their abdomens actively in a vigorous but rather ineffective attempt to rescue themselves. Length about 3.5 mm., greatest breadth about 0.7 mm., well-chitinised, the posterior half of the abdomen loosely enveloped by the larval pelt. The integument is shagreened and bears numerous small tubercles covered with coarse squamose spines, and sometimes armed with short spines or bristles.

Cephalo-thorax relatively large and broad, extended posteriorly over the middle of the first abdominal segment in the form of a relatively long and narrow process. Respiratory trumpets rather short (about 260μ), with a short broad stem and a large expanded distal extremity. The main tracheal trunk is wide, straight in the proximal part of the trumpet, and curved like a hook in the expanded distal part; at the point where the trumpet begins to expand is

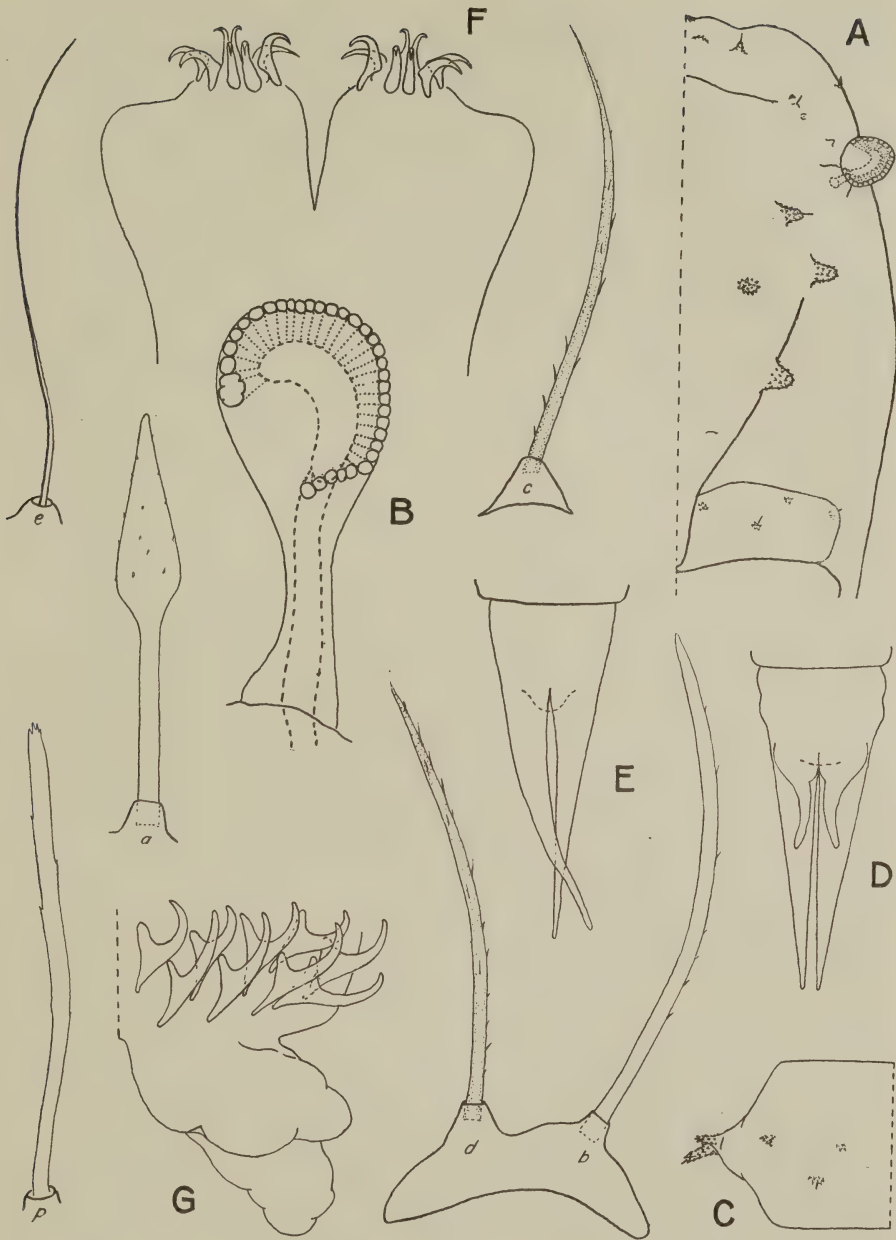


FIG. 3. *Forcipomyia castanea* (Walk.). Pupa: *A*—One half of the dorsal part of the cephalothorax showing the chief tubercles, *B*—Respiratory trumpet, *C*—One half of the fourth abdominal segment, dorsal view, showing the tubercles, *D*—Posterior extremity, ♂, dorsal view, *E*—Posterior extremity, ♀, dorsal view. Larva: *F*—Prothoracic pseudopod, ventral view, *G*—Anal blood-gill and hooks on one half of the posterior extremity of the body, ventral view; *p*, *a*, *b*, *c*, *d*, and *e*—macrochaetae lettered as by Saunders. *A*, *C*, *D*, and *E*, $\times c. 80$; others $\times c. 265$.

a small posterior diverticulum. From the whole length of the external border of the tracheal trunk in the distal expansion arises a fan-like arrangement of short branches (the number varying greatly, certainly from twenty-three to fifty-four), whose distal extremities form two-thirds of a circle (open only at the proximal side) which is bridged by a delicate granular membrane. The wing and leg cases are attached to the sides and extend backwards on the ventral aspect as far as the anterior border of the third abdominal segment. There are a few tubercles on the cephalo-thorax, all of them rounded or conical prominences, and most of them covered by squamose spines. The following may be distinguished. Situated on the operculum are three low, rounded tubercles which are unarmed; one, the smallest, in the middle line a little behind the anterior margin of the cephalo-thorax, and two, one on each side, at the anterior margin. The latter possibly correspond with the anterior marginal tubercles of *Culicoides*. Anterior dorsal: a small tubercle bearing a short spine, situated a little behind and external to the anterior marginal tubercle. Anterior dorso-lateral: a small tubercle, unarmed, situated just in front of and external to the base of the respiratory trumpet. A little anterior and internal to this tubercle are three other small tubercles arranged in an antero-posterior row, the middle one bearing a short spine and the other two unarmed. Laterally or ventro-laterally, a little posterior to the respiratory trumpet, are two or three small elevations which are unarmed. Dorsal tubercles: situated on each side of the central portion of the thorax are four relatively large, conical, but not finger-like tubercles arranged in the form of a diamond; the anterior one bears a short spine, the other three are unarmed. There are traces of other unarmed tubercles rather more posteriorly, just anterior to the first abdominal segment, but they are very indistinct. No tubercles could be distinguished on the ventral aspect of the cephalo-thorax; the ventro-median is represented by a minute hair.

Abdomen directed straight backwards and partly enclosed in the larval pelt. It consists of nine well-developed segments, and is broad at the base, narrowing gradually but rather rapidly towards the apex. The first segment is short and narrow, the second deep and broad, the ninth elongated, and the intermediate segments rather broad and short, and narrowing successively as the posterior

extremity is approached. The last segment terminates in two long, straight, nearly parallel, lateral processes which taper to pointed extremities; in the male this segment is furnished also with two shorter, finger-like, dorsal processes. The abdominal tubercles are covered with squamose spines and are mostly small; on a typical segment, for example the fourth, they are arranged as follows on each side. On the dorsal surface are three tubercles, two admedian and one dorso-lateral; the admedian tubercles are small, the anterior one unarmed, the posterior one, which is situated rather more externally, bearing a small spine; the dorso-lateral tubercle is small and unarmed, it lies at about the same level as the anterior admedian tubercle. At the side are two relatively large, prominent, finger-like tubercles, the one dorsal to the other, situated about the middle of the segment, and bearing minute spines; the more ventral of the two is the larger. On the ventral surface only a small double tubercle appears to be present, this is situated about the middle of the segment and bears two small spines. The size of the abdominal tubercles diminishes as the posterior end is approached; they may be almost obsolete and represented only by one or two squamose spines on the distal segments. The arrangement of the dorsal tubercles described above applies only to segments 2 to 5, on segments 6 to 8 the tubercles are almost completely absent, being replaced by a few socket-like marks and two or three small spines one of which, situated in a submedian position, is rather strongly developed. The ventral tubercles are recognisable as such on segments 3 to 5 only, on segments 6 to 8 they are represented by two minute spines. On the first segment there are four small tubercles, and two socket-like marks; on the last segment no definite tubercles are discernible, but laterally are three insignificant elevations.

LARVA (fig. 3). The body of the young larva has a dull white colour and is semi-transparent; when more mature it is darker, chiefly owing to the dark brown intestinal contents showing through the cuticle. The head is dark brown. The larva is fairly active and browses on the surface of damp vegetable débris. In this situation it is not easily seen, unless the light catches the tips of the dorsal spines and shows them as a long double row of pale, glistening points. In progression the head is used freely. The anal blood-gills are not easily seen in the living larva and are retracted in dead specimens

unless they have been killed and fixed by hot (65° C.) solutions. When about to pupate, the larva ceases to browse, settles in some chosen spot on the surface of the medium, and becomes whiter and more opaque; other changes that may be noted are a thickening of the three anterior body segments due to the development of the imaginal discs, and a retraction of the eyes. The duration of the larval period is about ten days.

Length when mature, 4 mm. to 4.5 mm. *Head* strongly chitinised, almost black anteriorly, showing a colour pattern somewhat similar to that of *F. picea* in Saunders' figure. Antennae of the usual form, short (about 90 μ) and straight, and bearing at the end a short, pointed process. The paired sensory hairs *p.* and *q.* of Saunders are long, stout, slightly curved, feebly chitinised, somewhat similar to those of *F. picea* but slightly hairy or serrated. The other hairs of the head apparently similar to those of *F. bipunctata*. Mouth parts similar to those of *F. bipunctata*: mandibles with three large teeth at the distal end.

Body with cuticle covered with spicules. Armature of bristles and spines on the abdominal segments as follows. A pair of long spear-shaped admedian dorsal spines (macrochaeta *a* of Saunders) arising from tubercles which in mature larvae are connected together across the back by a narrow chitinous band; two pairs of long, slightly curved, dorso-lateral setae (*b* and *d*) arising from large double tubercles; a pair of setae (*c*) similar to *d* but longer, arising from conical tubercles; and two pairs of long, stout, simple, ventro-lateral hairs (*e* and *f*) arising from small tubercles. The spear-shaped dorsal spines are about 200 μ long, the blade-like distal portion measures about 25 μ at its broadest part, has a long point, and is sparsely covered with spicules; the length of the shaft is only slightly greater than that of the blade-like portion. The description of these spines as spear-like is scarcely appropriate, as the distal portion is not flat but is cone-shaped; in lateral view, however, they appear spear-like, and as this descriptive term has been used before, it is again used here. There are twelve pairs of these spines, the first pair being rather small, and the last modified, the tubercles from which they arise being broadly fused and the distal ends of the spines being only slightly broader than the shafts. The two dorso-lateral setae (*b* and *d*) arise the one slightly more dorsally than the

other; the former (*b*) is not highly chitinised, is very sparsely clothed with barbs, is rather blunt-ended, and is similar to the head hairs *p* and *q*; the latter (*d*) is shorter, highly chitinised, dark coloured, well-barbed, and more pointed.

The prothoracic pseudopod is cleft distally but not very deeply, the two parts not widely separated, broad at their extremities, with the crowns of hooks (six strong, and two more delicate) situated on their inner sides. Anal blood-gills bilobed. Posterior pseudopod armed with, usually, nine large hooks in two rows on each side of the middle line. Malpighian tubules apparently three.

EGG. The eggs are a dull white colour, smooth, ellipsoidal or whetstone-shaped; length about 205μ , middle breadth about 78μ . When laid they apparently adhere by their sides; they may sometimes be seen thus, forming a chain, whilst still attached to the body of the female.

GOLD COAST: Accra, numerous specimens, both males and females, taken on the windows of the laboratory in the evening at all times of the year. Numerous specimens also reared from eggs laid by females in captivity, and hatched from rotting banana fibre. Nsawam, reared from vegetable matter from a rot-hole in a tree.

FORCIPOMYIA BIANNULATA, sp.n.

Length of body (average), 2 mm.; length of wing, 1.3 mm.; greatest breadth of wing, 0.3 to 0.5 mm. In the male the wings are relatively longer and narrower than in the female. With narrow scales.

Head dark brown. Eyes bare, broadly contiguous above in both sexes, the facets separated by a narrow line. Clypeus, proboscis, and palpi dark brown. Palpi similar to those of *Forcipomyia castanea*. *Antennae* brown. In the female segments 3 to 10 bearing stout, curved spines, about as long as the segments, colourless, with rather blunt ends; and whorls of about seventeen hairs. The flagellum segments sub-equal, forming an almost continuous series, the fifteenth, however, slightly longer than the rest; segments 3 to 10 somewhat flask-shaped, segments 11 to 14 with a distinct 'collar,' and the last segment ending in a small blunt stylet. The combined length of segments 11 to 15 less than that of segments 3 to 10,

or 4 to 10, e.g. in one specimen measuring 77 units as compared with 118, or 101 units. In the male similar to those of *F. castanea*, but the last segment perhaps a little shorter, the lengths of the five terminal segments in one male being 12, 47, 26, 20, and 25 units respectively. The combined length of segments 12 to 15 equal to that of segments 3 to 11. *Thorax* uniformly dark brown dorsally, densely clothed with yellowish hairs. Pleura paler, golden-brown, paler in the male than in the female, with a darker brown spot immediately under the base of the wing. Scutellum and post-scutellum dark brown, the former bearing numerous long, yellowish bristles and shorter hairs which are more abundant in the female than in the male. *Wings* similar to those of *F. castanea*, densely clothed with dark brown hairs and narrow scales, and with a small pale, yellowish spot at the distal end of the costa enveloping about two-thirds of the distal radial cell. The wings in the male are narrower than in the female, less hairy, but with a distinct pale spot, and some infuscation in the neighbourhood of the intercalary vein and of the rami of the fourth and fifth veins. Venation similar to that in *F. castanea*; but the first and third veins are fused basally so that the first radial cell is obsolete; the second radial cell, however, is well-formed. Halteres with cream-coloured knobs and almost colourless stems. *Legs* yellowish-brown, terminal tarsal segments somewhat infuscated. Hind femora with a broad dark brown apical band which completely encircles the limb, hind tibiae with a similar band covering the basal third, knees not infuscated. The development of the bands on the hind legs is subject to some degree of variation. Legs moderately hairy and bearing also narrow scales, a few of the hairs, such as two on the ventral aspect of the first tarsal segment, being exceptionally long. The middle and hind tibiae of the female bear also one or two peculiar short, hastate hairs or spines (fig. 4, D): these spines are not present in the male. In the male the first tarsal segment about equal to the second on the fore legs, but shorter (about three-quarters the length) on the middle and hind legs; in the female the first tarsal segment about equal to the second on the middle and hind legs, longer (about one-third longer) on the fore legs. Claws and empodium similar to those of *F. castanea*. *Abdomen* in the female dark brown dorsally, paler brown ventrally and at the sides, clothed with dark and light brown

hairs and narrow scales ; in the male paler, light brown, with broad dark brown bands on the segments which are broadest ventrally, and larger and more complete towards the posterior extremity ; clothed with rather sparse and long hairs. Hypopygium dark brown. Spermathecae two, dark brown, highly chitinised, more or less oval, often unequal (in one extreme example measuring 68μ by 65μ and 133μ by 87μ respectively) ; the commencement of the duct chitinised for only a short distance (about 4μ).

HYPOPYGIUM (fig. 4, A to C) similar to that of *F. castanea* but more highly chitinised and more deeply infuscated. Ninth segment similar to that of *F. castanea*, but sternite less hairy. Forceps similar to those of *F. castanea*, but darker, the tips of the claspers being dark brown ; side-pieces clothed with strong hairs which, however, are not very long. Harpes long, slender rods tapering to

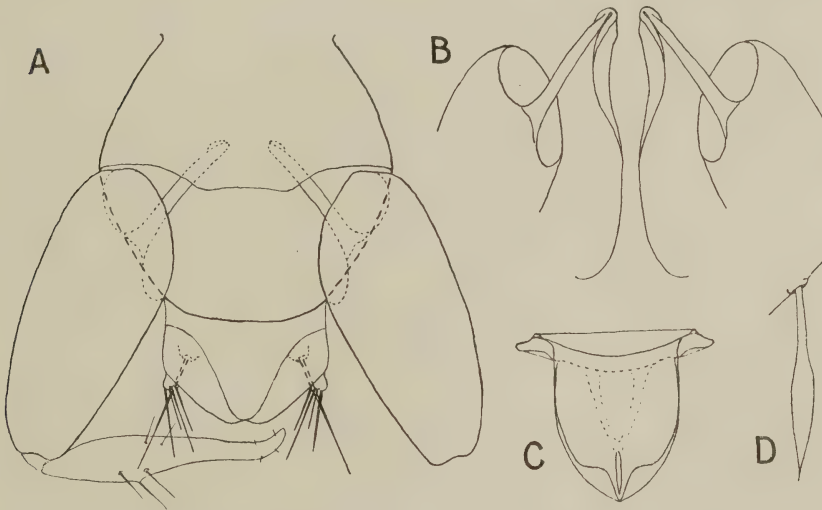


FIG. 4. *Forcipomyia biannulata*, sp.n. ♂: A—Ninth segment and forceps, B—Harpes, C—Aedeagus, all ventral views. ♀: D—Hastate tibial hair.

filiform extremities, similar to those of *F. ashantii*. Aedeagus broad and shield-like in ventral view, somewhat resembling that of *F. castanea* but differing in detail and more highly chitinised.

GOLD COAST: Accra, numerous specimens, both males and females, taken in the evenings on the windows of the laboratory at all times of the year, but more abundantly during the second half.

NIGERIA: Afikpo, 2.6.1910, 1 ♀ (Dr. J. J. Simpson); Lagos, June, 1921, 1 ♀ (Dr. H. A. Foy).

NYASALAND: South-east shore of Lake Nyasa, March, 1910, 1 ♂ (Dr. S. A. Neave).

This species resembles *F. castanea* but may be readily distinguished from it by the presence of a dark brown basal band on the tibiae of the hind legs.

FORCIPOMYIA AURIPES, sp.n.

Length of body (one male), 2.9 mm.; length of wing, 1.8 mm.; greatest breadth of wing, 0.4 mm. A large, dark brown species with dark brown femora and tibiae and yellowish tarsi.

Head dark brown. Eyes bare; broadly contiguous above, but actually very narrowly separated. Clypeus and proboscis brown. First and second segments of the palp brown, other segments missing. *Antennae* incomplete in the single specimen examined. Basal segments of the flagellum brown apically, yellowish basally, the line of insertion of the whorl hairs separating the two colour zones; plume dark brown with a paler brown tip. The length and greatest breadth of the eleventh and twelfth segments about 20 by 9, and 78 by 8 units respectively. Segments 13 to 15 missing. *Thorax* almost uniformly dark brown, but showing traces of the three longitudinal stripes on the dorsum so common in the genus; pleura slightly paler brown than the dorsum. Hairs rather sparse, no scales. Scutellum and post-scutellum dark brown; the former bearing about twenty bristles and hairs. *Wings* long and narrow, pale brown, closely covered with minute microtrichia of the usual form and densely clothed with decumbent hairs; bearing also on the costa and first and third veins long lanceolate scales. No bare areas along the veins. Costa reaching beyond the middle of the wing (65:101 units), to the distal third. First and third veins contiguous basally, the proximal cell obsolete or a mere slit, the distal one long and narrow. Bifurcation of the fifth vein proximal to the end of the costa, at about the level of the base of the distal radial cell; anterior ramus reaching the margin of the wing a considerable distance beyond the level of the end of the costa. Hairs of fringe with rather long fimbriae, sub-plumose. Halteres darkish

brown, knobs containing a white pigment. *Legs* with dark brown femora and tibiae, yellowish tarsi. Scales present on the femora and distal segments. First tarsal segments two-and-a-half, two, and one-and-a-half times as long as the second on the fore, middle, and hind legs respectively. Claws about half the length of the fifth tarsal segment; empodium as long as the claws, hairy. *Abdomen* dark brown, especially posteriorly, and in the single specimen examined containing much actually black pigment. Hairs on the posterior part of the abdomen long, especially those on the ventral surface. Scales present on the dorsal surface.

HYPOPYGIUM (fig. 5). Ninth segment very dark brown, both tergite and sternite well-clothed with dark brown hairs of moderate

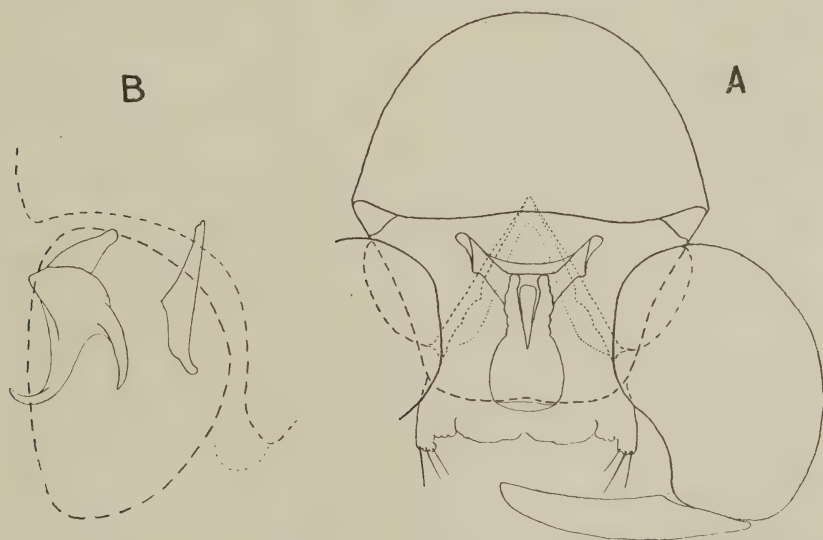


FIG. 5. *Forcipomyia auripes*, sp.n. ♂: Diagrams of hypopygium. A—Ventral view, B—Lateral view to show the relative positions of the aedeagus and the dorsal process arising at the base of the side-piece. $\times c. 265$.

length; sternite not notched in the middle line posteriorly. Forceps: side-pieces broad, uniformly very dark brown, clothed with numerous dark hairs some of which are of great length and others very stout and strong; claspers dark brown, shaped like the blade of a scythe, pubescent to the tips. Harpes: the rod-like structures which arise dorsally at the bases of the side-pieces converge anteriorly and meet in a sharp point; these rods are of dense chitin, but are extended internally into a narrow strip of delicate chitin. Aedeagus

in ventral view showing a broad basal arch which is well-chitinised, and a posterior extension of delicate chitin with a rounded, slightly everted end.

GOLD COAST: Accra, 1920, 1 ♂, taken in the laboratory.

The position of this species is somewhat obscure. We have placed it in the Genus *Forcipomyia* because many of its characters are those of that genus, but it should be noted that the genitalia are not of the common type, and that the length of the costa and the form of the radial cells are unusual and more closely resemble those of the Genus *Lasiohelea*.

FORCIPOMYIA SQUAMIPENNIS, sp.n.

Length of body (both sexes), about 2.0 mm.; length of wing in the female, 1.4 mm., in the male 1.3 mm.; greatest breadth of wing in the female 0.4 mm., in the male 0.3 mm.

Head dark brown; occiput clothed with long, dark brown hairs intermixed with which are numerous rather short, striated scales. Eyes bare, broadly contiguous above in both sexes, the facets separated by a narrow line. Clypeus, proboscis, and palpi dark brown. Clypeus bearing about sixteen hairs. Palpi similar in both sexes; second, fourth, and fifth segments sub-equal, the last two rather broadly united, third segment longer than the fourth and fifth together, inflated in its middle third, and furnished with a shallow and not unusually large sensory pit. *Antennae* (fig. 6, c) brown. In the female segments 3 to 10 bearing long, slender spines, not much thicker than the hairs, as long as the segments, and tapering to rather sharp ends; and whorls of about twelve hairs. All the flagellum segments bear also short, and moderately short, spines. First segment rather large, petiolate, bearing numerous stout, dark brown, pubescent hairs, the longest of which project beyond the distal border of the torus. Torus sub-spherical, darker brown than the flagellum, bearing about a dozen hairs. Third segment with a quite short stalk. Segments 4 to 10 flask-shaped, almost sub-equal, length from about twice to two-and-a-half times the greatest breadth. Segments 11 to 15 sub-cylindrical, 11 to 14 sub-equal, about three times as long as broad, with a distinct 'collar'; the last segment

a little longer, about four times as long as its basal breadth, ending in a blunt stylet. The combined length of segments 11 to 15 (128 units) rather less than that of segments 4 to 10 (145 units). In the male segments 3 to 11, generally, similar to those of *F. castanea*, the eleventh measuring about 16 units by 8; plume large, with its distal half tawny brown. Segments 12 to 15 elongated, their lengths measuring in one specimen 57, 34, 28 and 28 units respectively, the last segment ending in a blunt stylet. The combined length of segments 12 to 15 (147 units) almost equal to that of segments 3 to 11 (142 units), and greater than that of segments 4 to 11 (119 units). *Thorax* uniformly darkish brown; well-clothed dorsally with light brown hairs and narrow scales, and with longer and darker hairs marginally and posteriorly. Pleura brown, paler than the dorsum. Scutellum dark brown, bearing an irregular submarginal row of about twelve to fifteen large, pale brown bristles, and numerous (twenty-five to fifty) small hairs and scales; the number of bristles and hairs in the male is smaller than in the female. Post-scutellum dark brown, bare. *Wings* in both sexes covered with the usual minute microtrichia and densely clothed all over with small, rather broad scales. In the female dark grey, with a number of rather ill-defined, cream-coloured spots arranged in much the same manner as those on the wings of *Culicoides*. Two pale spots are situated on the anterior half of the wing, the one just beyond the junction of the third vein with the costa, and the other, a large, diffuse spot, upon the apical fourth; there is also some indication of a pale spot covering the cross-vein, and the base of the wing is somewhat pale. Along the margin on the posterior half of the wing are four ill-defined pale spots, one each, between the rami of the fourth vein, between the fourth and fifth veins, between the rami of the fifth vein, and in the anal angle. The wing is darkest anteriorly, especially at the junctions of the first and third veins with the costa, and is clothed with scales, those upon the cream-coloured spots being of a yellow colour, those upon the darker portions of the wing being dark grey or dark brown. The scales are especially dense, broad, and dark upon the costa and the first and third veins. In the male the wings are narrower, less densely covered with scales, and a lighter colour, so that they appear to be pale, with darker markings, and not the reverse as in the female. Fringe long, composed of lanceolate

hairs which are delicately fringed. Costa reaching to about the middle of the wing. First and third veins fused basally, the proximal cell obsolete; second radial cell (fig. 6, A) large, about three times as long as broad (external dimensions). Petiole of fourth vein longer than the cross-vein; proximal ends of the rami almost obsolete. Bifurcation of the fifth vein in both sexes a little proximal to the level of the end of the costa. Halteres with dull white knobs. *Legs* in both sexes conspicuously banded, yellow and dark brown; femora, tibiae, and tarsi densely clothed with scales in addition to hairs. Coxae of all the legs dark brown. Femora with a broad dark brown band at base and apex, the bands being larger in the female than in the male, and the apical band in the male sometimes divided into two parts. Fore and middle tibiae with broad dark brown basal and apical bands each covering about one-third of the segment; hind tibiae with the basal third dark brown and the apical two-thirds yellow with a narrow dark brown band in its middle. The knees, however, are usually yellow. First tarsal segment with the basal two-thirds dark brown and the apical third yellow; second, third, and fourth segments more or less infuscated dark brown, in the middle; fifth entirely yellow. Middle tibiae with a transverse row of apical spine-like hairs, some of which may be nearly as long as the first tarsal segment. In both sexes the first tarsal segment on the fore legs is longer than the second (about 4 : 3), on the middle legs slightly shorter (about 11 : 12), and on the hind legs distinctly shorter (about 5 : 7). Claws small, less than half the length of the fifth tarsal segment; apparently not bifid in the male. Empodium about as long as the claws, hairy. *Abdomen* in the female uniformly dark brown, densely clothed with broad scales and with dark and light brown hairs, a tuft of hairs on the posterior extremity being especially long. Cerci pale brown. In the male pale, yellowish, longer and narrower than in the female, with dark brown bands near the posterior margins of the segments, which are broadest ventrally and towards the posterior end of the body; the dorsal aspect of the proximal half of the abdomen almost entirely yellow, and the ninth segment entirely dark brown. Abdomen well-clothed with scales and hairs, the latter particularly long and numerous on the ventral surface. Spermathecae (fig. 6, D) two, very highly chitinised, sub-equal, pyriform, with a rather long conical portion

leading to the duct; greatest breadth about 45μ to 50μ , and total length about 80μ to 85μ .

HYPOPYGIUM (fig. 6, E and F). Ninth segment dark brown; tergite very short, sternite with numerous hairs and scales. Forceps: side-pieces with dark brown apices and paler, yellowish bases; claspers rather densely chitinised basally, their ends somewhat expanded, spatulate, but not hatchet-shaped. Harpes very highly chitinised, shaped like strong hooks, crossing in the middle line, with their extremities bent ventrally and tapering to a point.

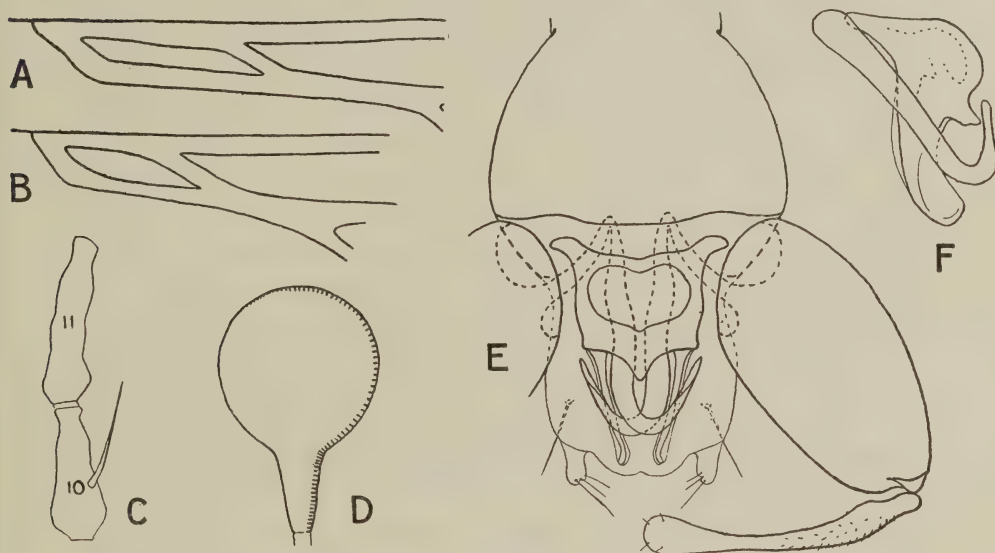


FIG. 6. *Forcipomyia squamipennis*, sp.n. A—Distal radial cell of wing of ♂, C—Tenth and eleventh segments of antenna of ♀, D—Spermatheca of female, E—Hypopygium of ♂, ventral view, F—Harpes and aedeagus, lateral view. *Forcipomyia lepidota*, sp.n. B—Distal radial cell of wing of ♂. D \times c. 400; others \times c. 265.

Aedeagus very highly chitinised in parts, having a ventral shield-like portion, the posterior edge of which is almost black and is produced into a median and two lateral projections, and on each side a little more dorsally, a strong, ventrally curved, rod-shaped structure.

GOLD COAST: Accra, 1920, ♂♂ and ♀♀; Aburi, 1912-13, 2 ♀♀ (W. H. Patterson).

It is not improbable that *F. chrysolopha* (K.) is identical with this or one of the three following species, but this fact can only be determined by a re-examination of the type materials, particularly the genitalia of the males.

FORCIPOMYIA LEPIDOTA, sp.n.

This species resembles the preceding one, *F. squamipennis*, in almost every respect excepting in the structure of the hypopygium of the male. The only points of distinction, and some of these may not be of any importance, since they are in characters which in other species are liable to variation, that we are able to detect after a careful comparison are as follows: The distal end of the antennal plume is pale, but not tawny; the terminal segments (11 to 15) of the antenna of the male measure in length (average of four specimens) about 14, 37, 22, 16, and 22 units respectively, the fourteenth segment, therefore, about one-fourth shorter than the fifteenth, and not about equal to it as in *F. squamipennis*. Scales on the wings smaller than in *F. squamipennis*, those on the surface of the wing narrower, more like lanceolate hairs. Fringe hairs lanceolate, but apparently simple. Distal radial cell (fig. 6, B) shorter. Bifurcation of the fifth vein slightly distal to the level of the end of the costa. Femora with dark bands broader than in *F. squamipennis*, occupying the greater part of the segment. Hind tibiae with basal dark-brown band somewhat narrower, and the second dark brown band somewhat broader than in *F. squamipennis*, so that the segment is divided into four areas of about equal length, alternately dark brown and yellow. The structure of the hypopygium is, however, quite unlike that of *F. squamipennis*.

HYPOPYGIUM (fig. 7, A and B). Ninth segment dark brown, not so densely covered with hairs as in *F. squamipennis*. Forceps: side-pieces dark brown, slightly paler brown or yellowish at the apex; claspers pale brown, rather delicately chitinised, with the distal extremity greatly expanded. Harpes apparently partly enfolded in the membranous portion of the aedoeagus, and difficult to see clearly in a fresh specimen. After treatment with caustic potash appearing as long, stout, strongly chitinised rods, tapering distally, and ending rather bluntly. Aedoeagus a complicated structure only partly, and not very highly chitinised; in ventral view the most characteristic features are a basal, stirrup-like portion with a median ventral process, and a distal, shuttle-like structure.

GOLD COAST: Accra, 1920, numerous specimens; Sekondi, July 1922, 3 ♂♂, 1 ♀, in a bungalow (Dr. J. F. Corson).

Owing to the similarity of this species to several others obtained at Accra which, apart from the structure of the hypopygium of the male, are almost, if not quite, indistinguishable, it has not been possible to decide with certainty which, if any, of the females of this type collected by us should be associated with it. A large number of females were collected with the males, all of which are practically identical, apart from variations in size which do not appear to be of importance. We are unable to separate them into different

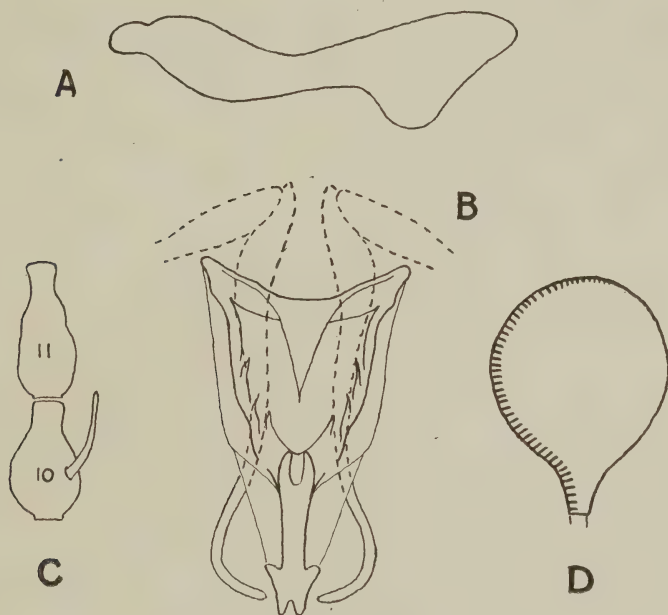


FIG. 7. *Forcipomyia lepidota*, sp.n. A—Outline of clasper of ♂, B—Diagram of harpes and aedocagus of ♂, ventral view, C—Tenth and eleventh segments of antenna of ♀, D—Spermatheca of ♀. D. \times c. 600; others \times c. 400.

species as has been done in the case of the males, and it must therefore be left for future investigation to decide whether they represent one or several species. In the meantime a description of the female should be given, and we propose to give it here, because the male *F. lepidota* was abundant in our material and it therefore appears to us probable that the female also was abundant, and because one such female was taken in a bungalow at Sekondi together with three males

of *F. lepidota*, the only species of this group hitherto collected in that locality. It must be clearly stated, however, that with equal or almost equal justice it might be claimed that the description is also that of the females of the two following species (*F. venusta* and *F. pampoikila*), and that we are unable to detect any differential characters of specific importance between the female reared from banana fibre together with a male of *F. venusta*, and therefore presumably the female *F. venusta*, and the female taken at Sekondi, together with three males of *F. lepidota*, and therefore presumably the female *F. lepidota*.

FEMALE. Length of body, 1.3 mm. to 1.8 mm. ; length of wing, 0.8 mm. to 1.0 mm. ; greatest breadth of wing, 0.3 mm. to 0.4 mm.

Head similar to that of *F. squamipennis*, but hairs on clypeus apparently fewer, five to seven, and third segment of the palp furnished with a deeper sensory pit. *Antennae* (fig. 7, c) brown. Large spines on segments 3 to 10 more or less geniculate, twice as stout as the hairs, shorter than the segments, with blunt ends. Flagellum segments forming an almost continuous series, as in *F. squamipennis*, but more distinctly. Segments 4 to 10 slightly constricted apically, but not so clearly flask-shaped as in *F. squamipennis*, sub-equal, less than twice as long as broad, the length and greatest breadth of segments 4 and 10 being in one example 9 by 7, and 10 by 6 units, respectively. Segments 11 to 15 elongated, sub-cylindrical, 11 to 14 sub-equal, about twice as long as broad (13 by 5 units), the last segment a little longer (17 units), about three times as long as broad. The combined length of segments 11 to 15 slightly less than that of segments 4 to 10, in one specimen 74 to 77 units. *Thorax* similar to that of *F. squamipennis*. *Wings* similar to those of *F. squamipennis*, but scales on the general surface narrower, as in the male. Distal radial cell as in the male *F. lepidota*. Bifurcation of the fifth vein slightly proximal to the level of the end of the costa. *Legs* similar to those of *F. squamipennis*; the hind tibiae adorned as in the male *F. lepidota*. *Abdomen* similar to that of *F. squamipennis*, but the scales rather narrower. Spermathecae (fig. 7, D) two, similar to those of *F. squamipennis* but smaller (average length about 60 μ , and greatest breadth about 40 μ), and with the proximal conical portion less largely developed.

FORCIPOMYIA VENUSTA, sp.n.

This species resembles *F. lepidota* so closely, that apart from the characters of the hypopygium of the male we are unable to separate the two with certainty. The measurements of the terminal segments (11 to 15) of the antenna of the male averaged in four specimens 15, 44, 26, 20, and 22 units in length respectively. The banding of the hind tibiae is as in the preceding species, *F. lepidota*. The structure of the hypopygium is, however, quite distinctive.

HYPOPYGIUM (fig. 8). Ninth segment dark brown; sternite rather more hairy than in *F. lepidota*. Forceps: side-pieces and claspers similar to those of *F. lepidota*. Harpes long, slender plates of chitin, not very highly chitinised, almost straight, tapering

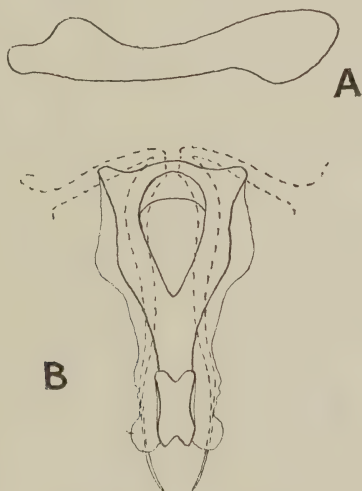


FIG. 8. *Forcipomyia venusta*, sp.n. ♂: A—Outline of clasper, B—Diagram of harpes and aedeagus, ventral view.

distally and ending in sharp points. Aedeagus similar to that of *F. lepidota*, but stirrup-shaped portion more uniformly chitinised, as shown in the figure.

GOLD COAST: Accra, 1920, numerous specimens taken on the laboratory windows; Nsawam, near Accra, 26.5.1920, 1 ♂, 1 ♀, reared from rotting banana fibre.

As in the preceding species, we have not been able to separate with certainty the female of this insect from those of allied species (see *F. lepidota*).

FORCIPOMYIA PAMPOIKILA, sp.n.

This species, like the preceding one, resembles *F. lepidota* so closely that apart from the characters of the hypopygium of the male we are unable to distinguish them with certainty. The measurements of the last five segments (11 to 15) of the antenna of the single male in our possession are approximately 14, 38, 23, 21, and 24 units respectively. The banding of the hind tibiae is similar to that in *F. lepidota*. The hypopygium is characteristic.

HYPOPYGIUM (fig. 9). Ninth segment dark brown, closely covered with hairs both dorsally and ventrally. Forceps: side-pieces dark brown at base and apex, with a paler, yellowish band

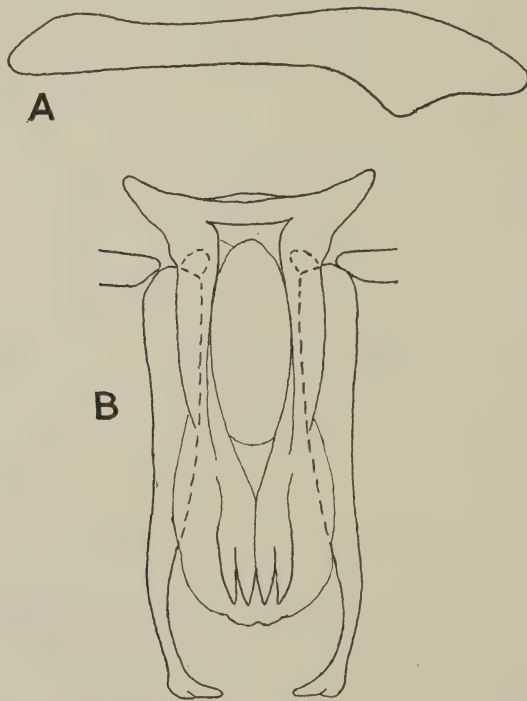


FIG. 9. *Forcipomyia pampoikila*, sp.n. ♂: A—Outline of clasper, B—Diagram of harpes and aedeagus, ventral view. \times c. 400.

about the middle; claspers pale brown, not very highly chitinised, only slightly expanded at the end. Harpes long, slender plates of chitin, almost straight, tapering distally and with ends slightly

expanded and shaped like the head of a duck. Aedoeagus of the usual form but mainly membranous or but feebly chitinised, distal end showing in ventral view four short chitinised processes.

GOLD COAST: Accra, 1920, 1 ♂, taken in the evening upon a window of the laboratory.

FORCIPOMYIA NIGROTIBIALIS, sp.n.

Length of body (one female), 1.6 mm. ; length of wing, 1.2 mm. ; greatest breadth of wing, 0.4 mm. A very dark brown, almost black, species, with dark brown tibiae on the middle and hind legs ; with scales. We have in our possession only a single specimen of this insect, and this unfortunately was partially destroyed by Psocids before our examination was completed, and in consequence our description is in some particulars deficient.

Head very dark brown. Proboscis and palpi dark brown. *Antennae* dark brown, with short dark brown hairs. Basal segments missing. Segments 7 to 10 oval, slightly narrowed anteriorly, sub-equal, about 12 by 7 units ; large spines pale brown, stouter than the hairs, a little longer than the segments, almost straight, tapering to pointed extremities ; the whorls of about twelve hairs. Segments 11 to 15 more elongated, sub-cylindrical, 11 to 14 sub-equal, about 15 by 6 or 7 units, the last segment a little longer, about 21 units, ending in a short, blunt stylet. *Thorax* : Dorsum very dark brown. Pleura very dark brown above, paler brown below. Scutellum very dark brown ; bearing a transverse row of seven large bristles, and about ten smaller bristles and hairs. Post-scutellum very dark brown. *Wings* unadorned, but the anterior margin somewhat darker than the rest of the wing, and the extreme base yellowish ; well-clothed with dark hairs and narrow scales. Microtrichia minute. Fringe as usual ; long hairs slightly curved, slender, apparently simple. Costa reaching to, or very slightly beyond, the middle of the wing. First radial cell obsolete or nearly, second well-formed. Bifurcation of the fifth vein at about the same level as the end of the costa. Halteres with yellowish knobs. *Legs* conspicuously marked, well-clothed with hairs and narrow scales, and bearing (especially on the femora and tibiae) large hastate spines with long tapering ends. Fore legs nearly

uniformly light brown. Middle legs with femora and tibiae very dark brown, excepting at the base of the femora and the apex of the tibiae, where they are light brown; tarsal segments light brown. Hind legs with apical half of femora light brown, basal half very dark brown; tibiae very dark brown, excepting at the extreme apex, which is slightly tawny; tarsal segments light brown. First tarsal segment of the middle and hind legs shorter than the second (about 35 : 41 and 40 : 49 units), that of the fore legs about equal to the second (about 36 : 33 units). Claws simple, equal, less than half the length of the fifth tarsal segment. Empodium well-developed, hairy. *Abdomen* very dark brown; densely clothed with dark brown scales. Spermathecae two, highly chitinised, sub-spherical, sub-equal, diameter about 50μ to 60μ ; the commencement of the duct chitinised for a very short distance, about 4μ .

GOLD COAST: Accra, 1 ♀, taken in the evening upon a window in the laboratory.

FORCIPOMYIA INORNATIPENNIS (Austen).

Length of body, 2.1 mm. to 3.1 mm.; length of wing, 1.4 mm. to 1.9 mm.; greatest breadth of wing, 0.4 mm. to 0.7 mm. The size varies greatly in both sexes, and the males are rather longer than the females on account of the size of the hypopygium, and have longer and narrower wings. In different individuals the colour also varies considerably, from brown to very dark brown, and females are usually darker than males. Long, slender, striated scales present.

Head brown to very dark brown; occiput clothed with yellowish or dark brown hairs. Eyes bare; broadly contiguous above in both sexes. Clypeus, proboscis, and palpi dark to very dark brown. Clypeus bearing about six to eight dark brown hairs. Mouth parts similar to those of *F. castanea*, but the mandibles of the female more slender and pointed at the ends, and armed with more numerous teeth (about fifty to sixty), those in the middle of the series being rather large; teeth on the maxillae also more numerous, about twenty-five. Palpi (fig. 10, A and B) in both sexes with second and fourth segments sub-equal, fifth small, not much more than half the length of the fourth, and third much the longest, twice as long as the fourth. In the female the third segment in its middle three-fourths is greatly inflated on its inner aspect, and is furnished with a very

large, oval, sensory pit with a relatively small anterior opening near which, on the surface of the segment, are a number of sensory hairs; in the male the third segment is slender, inflated to a lesser extent in its middle third, and furnished with an oval sensory pit of moderate size. *Antennae* brown to darkish brown. In the female segments 3 to 10 bearing moderately stout, slightly curved spines, as long as the segments, colourless, with pointed ends; and whorls

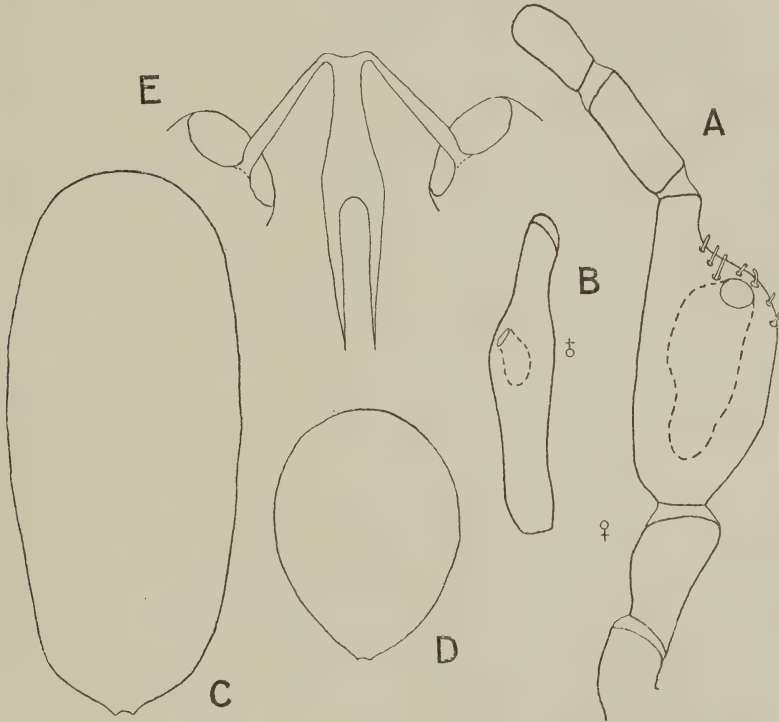


FIG. 10. *Forcipomyia inornatipennis* (Aust.). A—Palp of ♀. B—Third segment of palp of ♂. C and D—Spermatheca of ♀ to show variation in size and shape. E—Harpes of ♂, ventral view. A and B $\times c. 265$; C and D $\times c. 400$.

of about twelve hairs. The first segment rather large. The basal segments of the flagellum sub-equal, from sub-spherical to oval, the fourth and the tenth in one specimen measuring 12 by 12, and 15 by 9 units respectively. Segments 11 to 15 sub-cylindrical, elongated, 11 to 14 a little over four times as long as broad (about 30 by 7 units), with a distinct 'collar,' the fifteenth rather longer (about 43 by 7 units) and ending in a blunt stylet. The combined length of

segments 11 to 15 greater than that of segments 3 to 10, or 4 to 10, e.g. in one specimen measuring 165 units as compared with 113, or 98 units. In the male similar to those of *F. castanea*, but the terminal segments longer, the lengths of the last five segments in one specimen measuring 18, 65, 43, 38, and 44 units respectively. The combined length of segments 12 to 15 greater than that of segments 3 to 11, e.g. in one specimen 190 units as compared with 152 units. *Thorax* almost uniformly brown to very dark brown, shoulders rather paler brown; clothed with longish yellow hairs and short brown to yellowish hairs, and bearing also numerous small scales. Pleura a rather lighter brown than the dorsum. Scutellum and post-scutellum dark brown to almost black, the former bearing numerous bristles and hairs which in the female are more abundant than in the male. *Wings* rather densely clothed with dark brown lanceolate hairs, and bearing numerous long, striated scales on the costa and the first and third veins, which are very dark and dense, and give the wing in this region a darker appearance than elsewhere. There is no pale spot in the middle of the wing as in *F. castanea*, but the extreme base is somewhat lighter coloured than the rest. The wing surface is slightly infuscated in the neighbourhood of the radial cells and the adjacent intercalary vein and along the rami of the fourth and fifth veins. First and third veins fused basally, the first radial cell therefore obsolete, but the second well-formed. Costa extending to about the middle of the wing. Bifurcation of the fifth vein a little proximal to the level of the end of the costa in both sexes. In the male the wing is paler, less densely clothed with hairs and scales, longer, and narrower than in the female. Halteres with cream-coloured knobs. *Legs* yellowish-brown, the terminal tarsal segments somewhat infuscated; rather hairy and bearing also numerous scales. The hind legs may be entirely without dark bands, or may have well-defined dark brown bands on each side of the knees as in *F. biannulata*, or on the femora only; the middle legs may also have similar bands, but they are usually less well-developed than on the hind legs. The presence or absence of the bands on the legs appears to depend on the depth of general colouration of the specimen, the darker individuals showing the greater development of the banding on the legs. In the male, the first tarsal segment is about half the length of the second on the fore and hind legs; shorter, about

one-third the length of the second, on the middle legs ; in the female, the first tarsal segment is about two-thirds the length of the second on the fore legs, three-eighths on the middle legs, and a half on the hind legs. Claws and empodium similar to those of *F. castanea*. *Abdomen* uniformly brown to dark brown in the female, densely clothed with brown and golden-brown hairs, and long, striated scales which are particularly dense on the lateral aspects ; in the male paler, the proximal segments pale brown with more or less complete, broad, dark brown bands, and sparsely clothed with long, dark brown and golden-brown hairs, and bearing fewer scales. Hypopygium very dark brown. Cerci of the female paler than the rest of the abdomen. Spermathecae (fig. 10, c and d) two, very highly chitinised, oval, often unequal and rather variable in size, those measured ranging in length from 80μ to 130μ , and in breadth from 60μ to 80μ ; practically no part of the duct is chitinised.

HYPOPYGIUM similar to that of *F. castanea* but more highly chitinised and darker brown. Ninth segment similar to that of *F. castanea*. Forceps similar to those of *F. castanea* but darker ; claspers dark brown. Harpes (fig. 10, e) united by their basal halves, fork-like, the prongs pointed but not filiform. Aedoeagus similar to that of *F. biannulata*.

LARVA (fig. 11). A gravid female taken in the Accra laboratory on the 26th June, 1921, and imprisoned in a tube containing vegetable débris was observed on the following day to have laid eggs. Fifteen days later numerous larvae were found in the tube, but unfortunately none of them pupated, and six days later (18th July) it was found that all were dead. The dead larvae were preserved and are briefly described here. They are small, length about 2 mm., and presumably not fully grown ; dull white in colour, and armed with brownish setae and hairs. *Head* brown, without definite colour pattern. Macrochaetae *p* and *q* long, slender, slightly barbed, tapering to sharp points ; *p* longer than *q*. Antenna terminating in a small spine which, however, is longer than the corresponding spine in *F. castanea*. *Body* : admedian dorsal spines (*a*) small, hastate on segments 3 to 8, but much reduced on the other segments. On the fifth and sixth segments they are largest ; length about 78μ ; length and breadth of the terminal, spear-like portion about 33μ and 22μ respectively, the point not drawn out as in *F. castanea*. Dorso-

lateral setae (*b* and *d*) arising from a large double tubercle, both stout, brown, barbed setae; *d* straight and pointed, *b* longer, curved, and blunter. Macrochaeta *c* similar to *d* but shorter and slightly curved, arising from a conical tubercle. Ventro-lateral hairs (*e* and *f*) long and slender, arising from separate tubercles. Prothoracic pseudopod similar to that of *F. castanea*, but the crowns



FIG. 11. *Forcipomyia inornatipennis* (Aust.). Larva: A—Antenna, B—Anal blood-gill of one side, ventral view; *p*, *q*, *a*, *b*, and *d*—macrochaetae lettered according to Saunders. B \times c. 600; rest \times c. 400.

composed of only five hooks each. Anal blood-gills bilobed. Posterior pseudopod armed with eighteen hooks in two rows, nine on each side, as in *F. castanea*.

GOLD COAST: Accra, numerous specimens, both males and females, taken in the evening on the windows of the laboratory and in bungalows at all times of the year. Obuasi, Ashanti, April, 1920, 1 ♂ (Dr. A. S. Burgess).

NIGERIA : Lagos, June, 1921, 3 ♂♂, 6 ♀♀ (Dr. H. A. Foy) ; Oshogbo, November 1910, 1 ♂ (Dr. T. F. G. Mayer) ; Yaba, near Lagos, 20.5.1909, 1 ♂ (Dr. W. M. Graham), ' caught on hand near lamp at 9 p.m. '

TANGANYIKA : Dar-es-Salaam, 16.4.1920, 1 ♀ (W. C. C. Pakes), ' s.s. Prinzessin, one mile from shore. '

This species was originally described by Austen (1912) from a single female collected near Lagos. The large number of specimens in our possession have enabled us to describe the male and to add some points of importance with regard to the female. Perhaps our most important observation is that the species is variable and that individuals which are otherwise identical and which have indistinguishable genitalia may have either entirely unbanded legs, banded hind legs only, or banded middle and hind legs. Such characters as the colour markings of the legs without confirmation by morphological differences are, therefore, insufficient for specific distinction (see also *F. castanea*). The forms of *F. inornatipennis* with banded legs can only be regarded as a variety, and as it will be convenient, we propose to refer to them as *F. inornatipennis*, var. *ornaticrus*.

FORCIPOMYIA HIRSUTA, sp.n.

Length of body (one male and two females), 1.6 mm. to 2.2 mm. ; length of wing, 1.3 mm. to 1.5 mm. ; greatest breadth of wing, 0.4 mm. The body and the wings in the male are slightly longer than in the female. A very hairy, darkish brown species with banded legs.

Head darkish brown, occiput clothed with long, dark brown hairs. Eyes bare ; in the female broadly, in the male more narrowly contiguous above. Clypeus, proboscis, and palpi brown ; clypeus and palpi bearing rather numerous and long dark brown hairs. Palpi (fig. 12, A) with a rather large first segment ; second, fourth and fifth segments sub-equal, about as broad as long, the fourth nearly conical and broadly connected with the fifth ; the third segment longer than the fourth and fifth together, inflated basally, with a somewhat variable sensory pit which is sometimes divided into one or two small distal sensory pits in addition to the usual larger proximal one—in the male the sensory pit is reduced. *Antennae* :

In the female first segment rather large, darkish brown, bearing rather numerous, long, stout, dark brown hairs. Torus darkish brown. Segments 3 to 10 quite colourless basally, and dark brown apically, the change of colour taking place abruptly at the level of the whorl of hairs; segments 11 to 15 entirely dark brown. Segments 3 to 10 bearing long spines, which are almost as long as the segments, twice as stout as the hairs, and with pointed extremities; and whorls of about fourteen dark brown hairs. Segments 4 to 10 more or less flask-shaped, sub-equal, but gradually becoming a little longer, narrower, and more attenuated distally; the actual measurements of length and breadth of the fourth and tenth segments in one specimen being 15 by 9 and 19 by 8 units respectively. Segments 11 to 14 sub-cylindrical, tapering a little distally, sub-equal, a little more than three times as long as their basal breadth; segment 15 rather larger, about five times as long as broad, not tapering distally but ending in a rather long stylet. The combined length of segments 11 to 15 slightly greater than that of segments 4 to 10, but less than that of segments 3 to 10, the actual measurements in one specimen being 129, 124, and 141 units respectively. In the male the first segment a mere ring of chitin; the torus very large, yellowish-brown; the flagellum segments pale brown, but the last three darker than the others; and the plume dark brown basally and pale brown apically. General form of the flagellum segments as usual; the lengths of segments 11 to 15 in one specimen being 18, 67, 40, 30, and 33 units respectively. The combined length of segments 12 to 15 almost equal to (slightly greater than) that of segments 3 to 11. *Thorax*: Dorsum uniformly darkish brown, glossy, rather sparsely clothed with dark brown hairs, some of which are arranged so as to form a curved row on each side immediately in front of the scutellum; pleura paler, yellowish brown. Scutellum dark brown at the sides, a little paler brown in the middle; bearing in both sexes about twenty to twenty-five bristles and hairs, of which ten are especially large. Post-scutellum dark brown, with a small depression posteriorly. *Wings* brownish, darker in the female, without spots, covered with microtrichia as usual, densely clothed with decumbent hairs, and bearing on the costa and the first and third veins numerous dark brown, lanceolate scales; the hairs are most abundant near the anterior border of the wing and with the dark scales give the appear-

ance of a dark line in this region when examined with a hand lens. Fringe long. Costa reaching to the middle of the wing in both sexes. First and third veins fused basally, but forming distally a cell of some size. Bifurcation of the fifth vein at about the level of the end of the costa in the male, slightly proximal to it in the female. Halteres with buff-coloured knobs. Legs yellowish-brown, with darker brown bands at the apex of the hind femora, the base of all the tibiae, and the apex of the fore tibiae and about the middle of the hind tibiae; tarsal segments on all the legs infuscated. The darker markings are less distinct in the male than they are in the female. Legs very

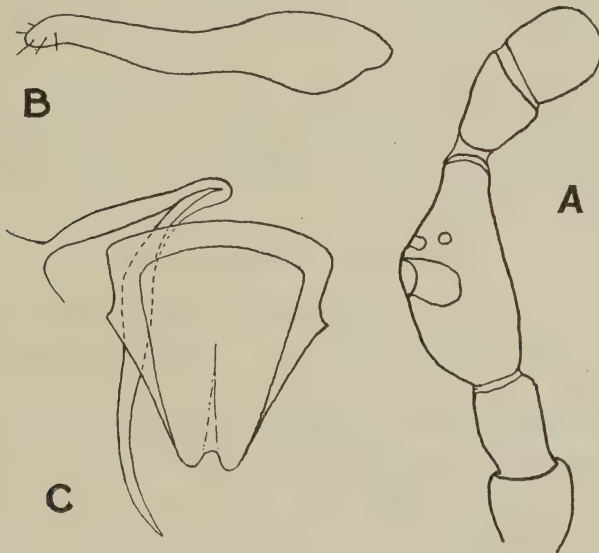


FIG. 12. *Forcipomyia birsuta*, sp.n. A—Palp of ♀. B—Clasper of ♂. C—Diagram of aedeagus and one harpe of ♂, ventral view. \times c. 400.

hairy, the tibiae in particular bearing very long hairs dorsally, some of them almost as long as the segment; bearing also broad scales on the femora and the distal segments. First tarsal segment in both sexes longer than the second on the fore and middle legs, very slightly shorter than the second on the hind legs. Claws and empodium as usual, but the claws in the male do not appear to be bifid. Abdomen darkish brown in the female, paler brown in the male and with darker brown markings especially on the posterior segments; in both sexes very hairy posteriorly, and bearing also

numerous scales. Hypopygium of the male brown. Spermathecae two, highly chitinised, sub-equal, pyriform, about 65μ by 45μ , the proximal end tapering to merge with the duct.

HYPOPYGIUM (fig. 12, B and C). Ninth segment of the usual form, hairy, lateral parts of the posterior extension of tergite slightly chitinised; Forceps: side-pieces oval, short and broad, densely clothed with dark brown and yellowish hairs, some of which are extremely long; claspers darkish brown, not expanded at the end. Harpes blade-like, long, narrow plates of delicate chitin, only slightly curved, tapering distally, with pointed extremities, somewhat resembling those of *F. venusta*. Aedoeagus feebly chitinised, but slightly denser at the sides and base than elsewhere, in ventral view triangular, with the apex notched.

GOLD COAST: Accra, 15.7.1920, 1 ♀, and 22.1.1921, 2 ♀♀, taken in the evening on the windows of the laboratory; Nsawam, near Accra, 19.11.1921, 1 ♂ and 1 ♀, reared from decaying banana fibre.

FORCIPOMYIA TIGRIPES, sp.n.

Length of body (one male), 1.8 mm.; length of wing, 1.3 mm.; greatest breadth of wing, 0.3 mm. A light brown species with banded legs.

Head darkish brown. Eyes bare, broadly contiguous above. Clypeus, proboscis and palpi brown. Palpi similar to those of *F. castanea*. *Antennae* pale brown. Proximal segments similar to those of *F. castanea*, but the five distal segments (11 to 15) dissimilar, measuring respectively about 19 by 8, 35 by 7, 29 by 6, 23 by 6, and 31 by 7 units, the last segment without a basal expansion, rather broader than the fourteenth, and ending in a blunt stylet. The combined length of segments 12 to 15 less than that of segments 3 to 11, and a little less than that of segments 4 to 11. *Thorax* rather dark brown dorsally. Pleura pale brown. Scutellum and post-scutellum dark brown, the former bearing about sixteen bristles and a dozen small hairs. *Wings* long and slender, densely clothed with lanceolate hairs and bearing dark brown scales on the costa and the first and third veins. Wings a pale colour, with a small dark brown spot covering the second radial cell. Costa reaching not quite to the middle of the wing, first radial cell obsolete, second

well-formed; bifurcation of the fifth vein a considerable distance distal to the level of the end of the costa. Halteres with creamy-white knobs. *Legs* light brown with darker brown bands which are most distinct on the hind legs. Clothed with pale brown scales in addition to hairs. Bands on the hind legs covering the apical halves of the femora, the basal sixth and the middle third of the tibiae, the basal two-thirds of the first tarsal segments, and about the

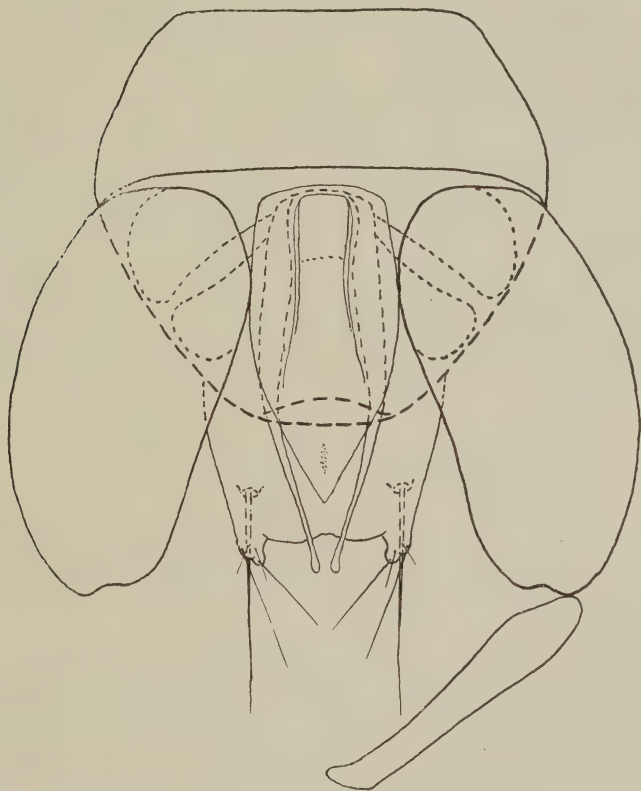


FIG. 13. *Forcipomyia tigripes*, sp.n. ♂: Diagram of hypopygium. $\times c. 400$.

middle two-thirds of the second, third and fourth tarsal segments. The bands on the fore and middle legs much less distinct and smaller, the only conspicuous ones being on each side of the knees, and on the basal two-thirds of the first two tarsal segments. First tarsal segment about equal to the second (44 to 49) on the middle legs, but on the fore legs distinctly longer (45 to 35), and on the hind legs

distinctly shorter (45 to 54) than it. Claws small, not half the length of the fifth tarsal segment, not very strongly curved. Empodium long and hairy. *Abdomen* pale brown, with darker brown bands, often incomplete dorsally, on the middle parts of the segments; clothed with brown scales as well as hairs.

HYPOPYGIUM (fig. 13) dark brown. Ninth segment similar to that of *F. castanea*: sternite moderately hairy; membranous posterior extension of tergite bearing dorsally a pair of large sub-lateral bristles, and furnished with lateral terminal processes each bearing two long and two short hairs. Forceps: side-pieces short and broad (40 by 20 units), dark brown, bearing some very long stout hairs; claspers similar to those of *F. castanea*, not very dark, but infuscated at base and apex. Harpes long and slender, tapering distally but with their ends slightly expanded; they appear to be united across the middle line at the base by a narrow bridge of chitin. Aedoeagus rather long, with a conical posterior termination; mainly membranous, but chitinised laterally, and in ventral view showing on each side a sub-median longitudinal ridge of brown chitin.

GOLD COAST: Accra, 1920, 1 ♂, taken in the evening on a window in the laboratory.

FORCIPOMYIA AETHIOPIAE, sp. n.

Length of body (one male), 1.1 mm.; length of wing, 0.9 mm.; greatest breadth of wing, 0.2 mm. A dark brown midge with hairy eyes; without scales.

Head dark brown. Eyes hairy; the facets rather widely separated, by about 18 μ . Clypeus, proboscis, and palpi brown. Clypeus bearing about six hairs. Palpi with first segment small, second and fourth sub-equal, not quite twice as long as broad, fifth small, shorter than the fourth, third about as long as the fourth and fifth together, slightly inflated in the middle, and furnished with a small sensory pit. *Antennae* darkish brown, the torus darker than the flagellum. Third segment smaller than the fourth, with a long (about 30 μ) petiole. Segments 4 to 11 of about equal length (10 to 9 units), but rapidly decreasing in breadth from 9 units in the case of the fourth, to 6 units in the case of the eleventh. Segments 12 to 15 elongated, measuring in length and greatest breadth about

27 by 6, 16 by 5, 13 by 5, and 17 by 7 units respectively; segment 12 shaped like the eleventh, but with the distal end greatly drawn out, segments 13 and 14 sub-cylindrical with a small basal dilatation bearing a whorl of hairs, and segment 15 broader than the rest, tapering slightly distally, and ending in a blunt stylet. The combined length of segments 12 to 15 practically equal to that of segments 4 to 11. *Thorax* uniformly darkish brown dorsally, pleura paler brown. Scutellum dark brown, bearing two lateral and five centro-marginal bristles (two of the latter being small), and about seven

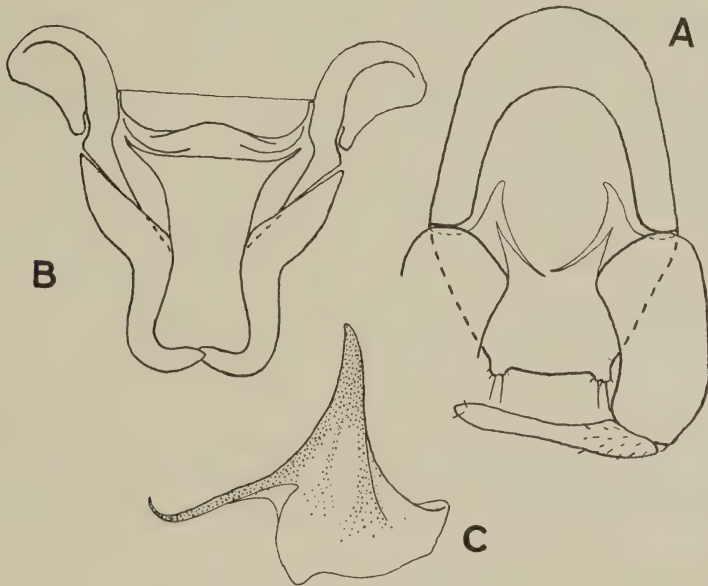


FIG. 14. *Forcipomyia aethiopiae*, sp.n. ♂: Diagrams of parts of the hypopygium in ventral view: A—Ninth segment and forceps, B—Aedeagus, C—Harpe. A $\times c.$ 375; B and C $\times c.$ 900.

smaller hairs Post-scutellum dark brown, darker than the scutellum. *Wings* unadorned, well-clothed with macrotrichia. Microtrichia minute. Frings hairs apparently simple. Costa reaching just beyond the middle of the wing (24 : 46). First radial cell obliterated, second well-formed, but not very long. Halteres with dull white knobs. *Legs* uniformly darkish brown. First tarsal segment more than twice the length of the second on all the legs, about three times the length on the fore and hind legs, rather shorter (36 : 16) on the

middle legs. Claws delicate, slender, more than half the length of the last tarsal segment, with bifid ends. Empodium long and hairy. *Abdomen* darkish brown, sparsely clothed with moderately long hairs.

HYPOPYGIUM (fig. 14). Ninth segment long, dark brown; tergite densely clothed with long, stout hairs, its posterior margin rounded and bearing at each side a small irregularly shaped process armed with a few short hairs; sternite very deeply excavated in the middle line posteriorly, the basal strip hairy. Forceps well-developed, side-pieces oval, slightly convex outwards, about twice as long as broad, and well-clothed with long, strong hairs; claspers highly chitinised, dark brown, the basal third covered by small hairs. Harpes apparently represented by an irregularly triangular plate of chitin on each side with a thin process directed towards the middle line where it is contiguous with, but so far as could be made out not connected with, its fellow of the opposite side. Aedoeagus a very complex structure showing in ventral view a highly chitinised basal bar, and on each side projecting posteriorly a highly chitinised hook-shaped process, the two hooks directed inwards at their ends and sometimes overlapping, but not fused together.

GOLD COAST: Accra, 1920, 1 ♂, taken on a window in the laboratory.

The systematic position of this species, of which we possess only a single male, is somewhat obscure, and it is placed here, with other species belonging to the genus *Forcipomyia*, provisionally only.

***FORCIPOMYIA INGRAMI*, Cart.**

Carter (1919) has described this species fully and has given excellent drawings of the more important parts, including a ventral view of the hypopygium of the male. The description of the latter, however, requires modification. At the same time, as we have at our disposal abundant material (including Carter's co-types), it may be of advantage to give additional or more exact details regarding certain parts which are now necessary for identification of the species.

The species is somewhat variable both in size and colour: usually dark brown as described by Carter, but sometimes much paler. Without scales. Eyes bare, apparently broadly contiguous, but

actually narrowly separated above in both sexes. The twelfth segment of the antenna of the male nearly three times as long as the eleventh and twice as long as the fourteenth, the thirteenth and fifteenth (including the stylet) sub-equal, a little longer than the fourteenth; the actual measurements of the last five segments (11 to 15) in three specimens of average size being approximately 14, 40, 29, 20, and 26 units respectively. The combined length of segments 12 to 15 slightly greater than that of segments 4 to 11, but less than that of segments 3 to 11. In the female occur whorls of about ten hairs and spines on the basal segments twice as stout as the hairs; the combined length of segments 11 to 15 slightly greater than that of segments 3 to 10, namely, about 84 to 75 units.

Scutellum in the male bearing about eight especially large bristles in a transverse row as in the female, but only about fifteen to twenty smaller bristles and hairs, that is about half the number in the female. In the male the costa reaching to the middle of the wing; bifurcation of the fifth vein distal to the level of the end of the costa. Halteres usually with white knobs in both sexes, sometimes with brown knobs, the pigment in them being in both cases white and the chitinous covering more or less infuscated. Fringe of the wing of the usual form, not, as shown in Carter's figures, a single row of hairs. First tarsal segment in the male slightly longer than the second on the fore legs, slightly shorter than the second on the middle and hind legs. Carter's statement that on the middle legs the first tarsal segment is slightly longer than the second is clearly an error, his co-type specimen showing the reverse relationship. Spermathecae (fig. 15, D) of the female, two, sub-equal, usually pyriform, with a terminal sub-spherical portion and a proximal conical portion leading to the duct, rather variable in size, but the greatest breadth usually about 50μ to 60μ and the total length about 65μ to 85μ .

HYPOPYGIUM (fig. 15, A, B and C). Ninth segment darkish brown, large, the proximal end long, very hairy both dorsally and ventrally. Posterior border of the sternite not excavated in the middle. Tergite with a membranous posterior extension which reaches back as far as the ends of the side-pieces, and is strengthened by a narrow rod of chitin on each side, ending in a process bearing three or four hairs—this is the process referred to by Carter as the basal lobe of the side-pieces. Forceps: side-pieces dark brown, not quite twice as

long as broad, almost reniform, with a rounded posterior extremity ; claspers pale brown, not highly chitinised, broad with somewhat spoon-like ends. Harpes without posterior rod-like structures, dorsal root-like basal process of the side-pieces long and slender with a small barb at its posterior third, fused proximally with its fellow of the opposite side to form a wide arch, as figured by Carter, in the middle of which is a slight thickening. Aedoeagus delicately chitinised (excepting at the base, where it is stronger) especially laterally, tapering distally so as to appear conical in ventral view, with a small terminal lip, which is slightly everted ventrally.

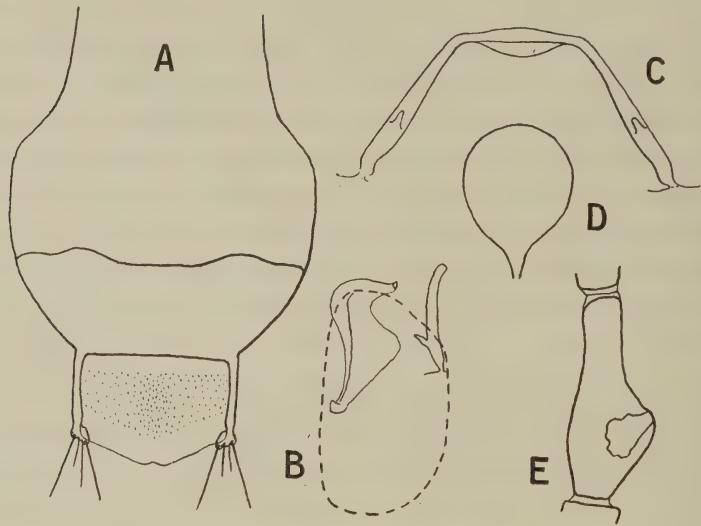


FIG. 15. *Forcipomyia ingrami*, Carter. *A*—Outline of ninth segment after removal of forceps and aedoeagus, ventral view. *B*—Hypopygium of ♂, lateral view, to show the relative positions of the aedoeagus and the dorsal process arising at the base of the side-piece. *C*—Dorsal processes arising from the bases of the side-pieces, ventral view of a disarticulated and slightly flattened specimen. *D*—Spermatheca of ♀. *Forcipomyia nigeriensis*, sp.n. ♀: *E*—Third segment of palp. *A*, *B*, *D*, and *E* × c. 265; *C* × c. 400).

GOLD COAST: Accra, abundant in the laboratory and in houses at all times of the year; Bole, 3.9.1911, 1 ♂ (Dr. A. Ingram); Kasunya, July, 1922, 1 ♂ (Dr. J. W. S. Macfie), reared from plants of *Pistia stratiotes* from the lagoon.

NIGERIA: Ilorin, 23.4.1912, 1 ♀ (Dr. J. W. S. Macfie); Yaba, near Lagos, 25.5.1909 and 28.6.1909, 2 ♀♀ (Dr. W. M. Graham), also 25.7.1913, 1 ♀ (Dr. J. W. S. Macfie); Calabar, February, 1922,

1 ♂ (Dr. E. C. Braithwaite); Victoria, April, 1921, 1 ♀ (Dr. L. H. Booth).

This species appears to resemble closely *F. rufescens* (Kieffer 1918), a Tunisian species, but to differ from it in general colouring, being usually dark brown with yellowish-brown legs, and not reddish with pale yellow legs. Moreover, *F. rufescens* is described as having the first and third veins of the wing fused in their proximal two-thirds, whereas in *F. ingrami*, Cart. (female) they are contiguous in their basal halves, but actually form a very narrow cell difficult to distinguish, and the scutellum yellow in the female and dark brown in the male, whereas in *F. ingrami* it is brown in both sexes. *F. seychelleana* (K.), *F. seychelleana*, var. *fulvithorax* (K.), and *F. kribiensis* (K.), also closely resemble *F. ingrami*; indeed, in the present state of knowledge it is difficult to select from the descriptions, satisfactory points of distinction, and it is possible some of the names are synonyms. An examination of the genitalia, which in Kieffer's species has not yet been made, would probably help in elucidating this matter.

FORCIPOMYIA EXIGUA, sp.n.

Length of body (two females), 1.0 mm. ; length of wing, 0.8 mm. ; greatest breadth of wing, 0.3 mm. A small, brown species with a pale brown scutellum, three rather indistinct brown bands on the dorsum of the thorax, and large white halteres.

Head darkish brown, occiput densely clothed with rather long brown hairs. Eyes bare, attenuated and narrowly separated above, the facets about 25μ apart. Clypeus, proboscis, and palpi brown. Palpi (fig. 16, A) with the second segment small, only slightly longer than broad ; fourth and fifth sub-equal, about twice as long as broad ; third as long as the fourth and fifth together, inflated at the base and furnished with a sensory pit of moderate size. *Antennae* uniformly brown ; torus rather darker than the flagellum segments. Segments 3 to 10 bearing stout, colourless spines, about twice as broad as the hairs, but not so long as the segments ; and whorls of about twelve brown hairs. Flagellum segments forming an almost continuous series with no abrupt change of shape between the tenth and eleventh segments, but the distal segments rather longer and more attenuated

apically; the fourth measuring in one specimen 8 by 7, and the fourteenth 11 by 6 units, the fifteenth segment broader than the others, about 14 units long, including the short terminal stylet. The combined length of segments 11 to 15 practically equal to that of segments 4 to 10, namely, about 60 units. *Thorax* brown; dorsum darker brown than the pleura, with three broad longitudinal darkish brown stripes, the middle one deficient posteriorly and the lateral ones deficient anteriorly. Scutellum pale brown, bearing an irregular transverse row of about ten bristles, and about fourteen smaller hairs. Post-scutellum brown, about the same colour as the mesonotum. *Wings* unadorned, densely clothed with decumbent hairs, but devoid of scales. Microtrichia minute. Fringe as usual. Costa short, not reaching to the middle of the wing. First and third veins contiguous in their basal two-thirds, the first cell obsolete or indistinct, the second definite but small (fig. 16, B). Bifurcation

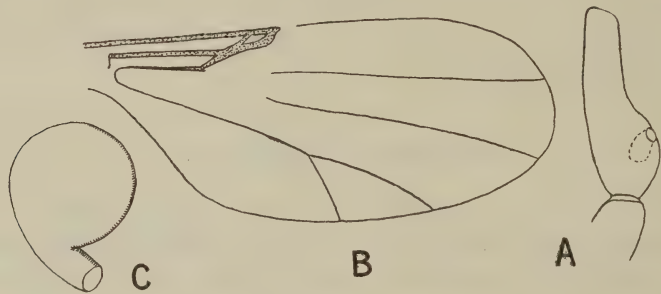


FIG. 16. *Forcipomyia exigua*, sp.n. ♀: A—Third segment of palp, B—diagram of wing venation, C—Spermatheca. A and C \times c. 400, B \times c. 80.

of the fifth vein a little distal to the level of the end of the costa. Halteres relatively large, with white knobs. *Legs* uniformly pale brown, bearing shortish hairs, and devoid of scales. First tarsal segment about two-and-a-half times the length of the second on all the legs; on the hind legs about as long as the four succeeding segments. Claws and empodium as usual. *Abdomen* brown, tergites with broad darkish brown bands covering almost the entire surface; sparsely clothed with hairs, but devoid of scales. Spermatheca (fig. 16, c) single, highly chitinated, shaped like a retort, the body sub-spherical, about 45μ in diameter, the chitinated portion leading to the commencement of the duct unusually broad, about 12μ .

GOLD COAST: Accra, 21.1.1920, 2 ♀♀, and 4.2.1922, 1 ♀, taken in the evening upon the windows of the laboratory.

This species differs from all the other species of the genus which we have examined in having only a single spermatheca.

FORCIPOMYIA ASHANTII, sp.n.

Length of body (one male), 1.6 mm. ; length of wing, 1.2 mm. ; greatest breadth of wing, 0.35 mm. A rather light brown species ; without scales.

Head darkish brown. Eyes bare, the facets separated dorsally by a narrow line. Clypeus, proboscis, and palpi darkish brown. Palpi similar to those of *F. castanea*. *Antennae* rather pale brown, the plumes dark brown with paler brown tips. Torus very large, dark brown, without hairs. Flagellum segments similar in general characters to those of *F. castanea*, but the last three rather shorter ; the lengths of the five terminal segments in one male were 13, 52, 23, 17, and 25 units respectively. The combined length of segments 12 to 15 about equal to that of segments 3 to 11. *Thorax* : dorsum uniformly light chestnut-brown with a slight greyish pruinescence, hairs scanty and short. Pleura much the same colour as the dorsum, not distinctly paler as in *F. castanea*. Scutellum about the same colour as the scutum, bearing fewer setae and hairs than in *F. castanea*, namely about 30. Post-scutellum slightly darker brown than the scutellum. *Wings* in some lights white and finely iridescent ; with a distinct pale golden spot about the middle of the anterior border covering the distal radial cell. On each side of this pale spot is a patch of dark brown macrotrichia, the distal patch being especially large and distinct, and half-way between this dark patch and the tip of the wing, the wing surface is slightly infuscated. In addition to these markings there are a number of dark brown macrotrichia in the region of the bifurcation of the fifth vein, which stand out rather prominently. Macrotrichia rather scanty, mostly pale brown. Costa reaching to the middle of the wing, first and third veins fused in their basal halves, but forming a rather large distal cell, bifurcation of the fifth vein slightly distal to the level of the end of the costa. Halteres very pale brown, the knobs containing white pigment. *Legs* almost uniformly yellowish-brown,

but with a rather inconspicuous, slightly darker brown spot at the distal end of the hind femora, and, in one specimen, with a trace of a brown band on the hind tibiae a little below the knee. First tarsal segment of the fore legs about the same length as the second; those of the middle and hind legs shorter than the second, about three-quarters the length. Claws and empodium as in *F. castanea*. *Abdomen* pale brown, with darker brown bands on the segments which are broadest and most conspicuous on the ventral surface and on the posterior segments. Hypopygium brown, the side-pieces pale brown apically and darker brown basally.

HYPOPYGIUM (fig. 17). Ninth segment similar to that of *F. castanea*, but sternite notched in the middle line posteriorly, and the hairs on the sternite fewer, reduced in the middle line to a single

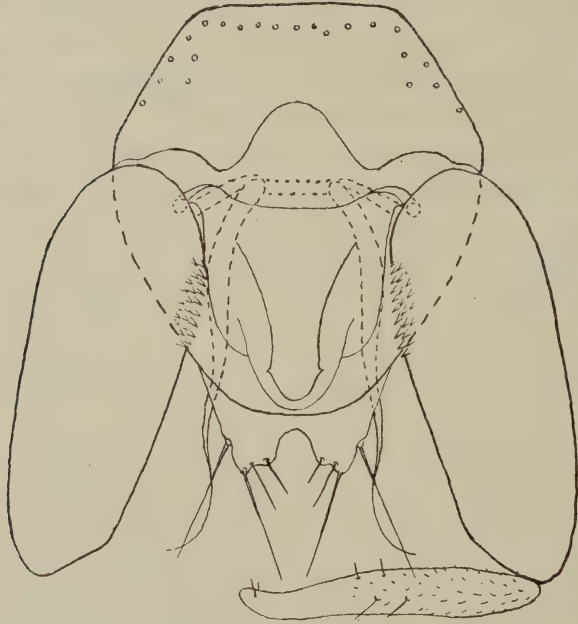


FIG. 17. *Forcipomyia asbantii*, sp.n. ♂: diagram of hypopygium, ventral view. $\times c. 400$.

basal row. Forceps generally similar to those of *F. castanea*, but side-pieces rather long, and bearing on the inner basal aspect a patch of short, stout spines or teeth. Harpes united basally by a narrow

band of chitin, ending in long, slender filaments, resembling thus those of *F. biannulata*. Aedoeagus bluntly conical, rather long, not unlike that of *F. tigripes*.

GOLD COAST: Obuasi, Ashanti, April, 1920, 3 ♂♂ (Dr. A. S. Burgess); Nsawam, near Accra, 1 ♂, reared from vegetable matter taken from a rot-hole in a tree; Accra, 2 ♂♂, taken in the evening upon windows in the laboratory.

NIGERIA: Yaba, near Lagos, 23.5.1909, 1 ♂ (Dr. W. M. Graham), 'in bedroom at 9 p.m.'

This insect resembles in many respects *F. castanea*, but is a paler, more uniform, brown colour, the thorax not notably darker dorsally than laterally, and the hind femora with only an inconspicuous darker spot. The genitalia of the male are quite distinct from those of *F. castanea*.

FORCIPOMYIA MELANCHROA, sp.n.

Length of body (one female), 3.0 mm.; length of wing, 1.6 mm.; greatest breadth of wing, 0.6 mm. A large, very dark brown, almost black, species; without scales.

Head very dark brown. Eyes bare; broadly contiguous above, the facets separated by a narrow line. Clypeus, proboscis, and palpi dark brown. Palpi similar to those of *F. castanea*: second, fourth, and fifth segments sub-equal, a little longer than broad; third about as long as the fourth and fifth together, its distal half narrow, its basal half greatly inflated and furnished with a large sensory pit. *Antennae* uniformly dark brown; torus rather small, scarcely darker than the flagellum segments. The large spines on segments 3 to 10 colourless or very pale brown, straight, pointed, as long as the segments, and at least twice as stout as the hairs; whorls of about twenty short, dark brown hairs. Segments 4 to 10 oval, sub-equal, the length and greatest breadth of the fourth and tenth being about 18 by 14, and 16 by 12 units respectively. Segments 11 to 15 elongated, sub-cylindrical; 11 to 14 sub-equal, about one-third longer than the tenth, and from two to three times as long as their basal breadth; the fifteenth slightly longer, about four times as long as broad, ending in a small blunt stylet. The combined length of segments 11 to 15 equal to that of segments 4 to 10, namely about

122 units. *Thorax* very dark brown, almost black. Dorsum showing indistinctly (because the insect is so dark), the three broad longitudinal bands common in this genus, and also a small short lateral band on each side. Pleura dark brown. Scutellum and post-scutellum almost black; the former bearing numerous bristles and hairs. *Wings* brownish, unadorned, darkest about the middle near the anterior border, densely clothed with dark brown decumbent hairs, but devoid of scales. Costa reaching a little beyond the middle of the wing. First and third veins darkish brown, fused in their proximal halves, but forming a distinct distal cell. Cross-vein and petiole of the fourth vein about equal. Bifurcation of the fifth vein just proximal to the level of the end of the costa. Halteres with pale brown knobs. *Legs* uniformly very dark brown, densely clothed with shortish, very dark brown hairs, devoid of scales. First tarsal segment about one-quarter longer than the second on the fore legs, and practically equal to the second on the middle and hind legs. Claws and empodium as usual. *Abdomen* uniformly very dark brown, well-clothed with shortish, very dark brown hairs, but devoid of scales. Spermathecae two, highly chitinised, oval, large, unequal or sub-equal, about 200μ to 300μ by 120μ to 150μ ; practically no part of the duct chitinised.

GOLD COAST: Accra, 26.12.1920, 1 ♀, taken in the evening in a bungalow; Obuasi, 23.11.1906, and 5.7.1907, 2 ♀♀ (Dr. W. M. Graham).

FORCIPOMYIA NIGERIENSIS, sp.n.

Length of body (one female), 2.3 mm.; length of wing, 1.5 mm.; greatest breadth of wing, 0.5 mm. A large, dull brown species with some general resemblance to *F. inornatipennis* (Aust.), but with wings not so hairy, and legs a dull brown in place of a yellow brown. General colouring similar to that of *F. ingrami*. Without scales.

Head darkish brown. Eyes bare, contiguous above but rather narrowly, the facets separated by a narrow line. Clypeus, proboscis, and palpi darkish brown. Palpi (fig. 15, E) with second, fourth, and fifth segments sub-equal, not twice as long as broad; third segment as long as the fourth and fifth together, ham-shaped, the basal half much inflated and furnished with a large sensory pit which

has a small, circular, anterior opening. *Antennae* uniformly darkish brown. Torus about the same colour as the flagellum segments, rather small, bearing about a dozen hairs. Segments 3 to 10 bearing large spines, about twice as broad as the hairs, not quite as long as the segments, and with rather blunt ends; and whorls of about twelve dark brown hairs which are mostly only slightly longer than the segments. Flagellum segments forming an almost continuous series with no abrupt change of shape between the tenth and the eleventh segments, but the terminal segments rather longer and more constricted apically, the fourth measuring 16 by 12, and the fourteenth 19 by 10 units. Last segment unfortunately missing. So far as can be judged, however, the combined length of segments 11 to 15 would be rather less than that of segments 4 to 10, or 3 to 10, namely, about 94 as compared with 108 or 126 units respectively. *Thorax* uniformly darkish brown, clothed with short, slender, brown hairs; pleura not quite so deep a brown. Scutellum and post-scutellum darkish brown, the former bearing about twenty bristles and a few small hairs. *Wings* light brown, unadorned, well-clothed with rather slender decumbent hairs, but apparently devoid of scales. Costa extending slightly beyond the middle of the wing (46 : 81 units). First radial cell obsolete, second well-formed. Bifurcation of the fifth vein a little proximal to the level of the end of the costa. Halteres pale brown. *Legs* almost uniformly darkish brown, hairs rather short, devoid of scales. First and second tarsal segments sub-equal on all the legs, first actually very slightly longer. Claws and empodium similar to those of *F. castanea*. *Abdomen* brown, venter slightly paler than the dorsum, clothed with shortish hairs. Spermathecae two, not very highly chitinised, oval, sub-equal, large, about 150μ by 100μ ; the commencement of the duct chitinised for only a very short distance (about 7μ).

NIGERIA: Lagos, 2.7.1921, 1 ♀ (Dr. H. A. Foy.)